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The Outlook

Demand—but no Supply

IT might be unfair to blame anyone in particular for the fact that we have been living in a civil aviation fool's paradise during the last two years. The future looked very different in 1945, and official plans were made for this future, not for the near-starvation, export-at-any-cost Britain of to-day. Civil aircraft were laid down for use almost exclusively on our own internal, European, Empire and trans-Atlantic services.

Whether all these aircraft will be suitable even for this somewhat specialized work remains to be seen, but it is certain that had it not been for the independent decisions of certain individual manufacturers there would have been none really suitable for the remainder of the world's operators.

At the moment, every airline operator in the world is either ordering new types or preparing to replace obsolescent types during the course of the next two or three years. Many of them would prefer to buy British aircraft if we had anything up to date and likely to be available at the right time and of the right size. This we could have had if——.

The position was becoming clear long ago, yet there was no appearance of urgency in the making of new decisions while there was still time. The case of the Ambassador, for instance, has remained in the pending tray while British European Airways carefully sifted the evidence for and against this type. A decision has now probably been reached, but at the moment of going to press there has been no official statement. A home order was necessary before the company concerned could go into production with this aircraft—but need the order necessarily have come from B.E.A.? This Corporation had already spent much time and money on the development of the Vickers Viscount, which was planned exactly to their requirements.

This is as it should be, but why, in the meantime, and knowing the export value of the Ambassador, could not an order have been placed for Transport Command for instance? Means could surely have been found to get production under way before it was too late, as it will be if the production of the Ambassador is being planned to suit the convenience of B.E.A., who are not likely to want to start operating a new aircraft much before 1951.

Of course, production should have been started two years ago or more. This "policy" of building a prototype or two and then waiting for something to turn up is indicative of only one thing—lack of confidence. Either an aircraft is worth building in numbers for a known market or it is not worth building at all. And if the Ministries do not know what is wanted then let the matter be left in the hands of the aircraft industry, which is familiar with and more at the mercy of the only universal law—that of supply and demand.

To H.R.H. Princess Elizabeth, Permanent Grand Master of the Guild of Air Pilots and Navigators of the British Empire, and to Lieut. Philip Mountbatten, R.N., "Flight" adds to the thousands of messages from all over the World its Congratulations and Loyal Good Wishes on this their Wedding Day.

Collaboration

AMONG the reasons often given for America's present lead in civil aircraft, apart from the circumstances of the recent war, is the fact that many, if not most, of her commercial types have been designed and developed in the very closest co-operation between the manufacturers and the operating companies.

In this country the present muddled set-up has not been calculated to facilitate such close teamwork, a fact

which may have had a not inconsiderable influence upon ultimate results. A welcome proof that the lesson has been taken to heart, and that where there is a will there is a way in spite of obstacles, is afforded by the manner in which the design of the Vickers Viscount has been tackled (pp. 568-571).

The British European Airways Corporation has spent large sums of money on the development of the Viking, and to have any hopes of seeing this outlay back, the Viking must remain in operation for another four or five years at least. This fact has given the Corporation an opportunity to go into great detail in its discussions with Vickers-Armstrongs about the Viscount, and it is probably true to say that not since de Havillands designed the Dragon specially for Mr. Hillman has a new type been produced in such intimate collaboration between manufacturer and user.

Airscrew-turbine power units are the main uncertainties in the present Viscount plans, but the building of three prototype aircraft, one for each of the units contemplated, should result in reducing the testing period to a minimum. The three engine firms concerned were also brought into close consultation, so that it does appear that in the Viscount we have an example of co-operation which deserves to be followed in the future. The result cannot fail to benefit all concerned.

Stalls and Vanes

SOME months ago we referred to the re-invention in America of a stall-warning device. Re-invention is the right word, for in this country there was available more than twenty years ago the Savage-Bramson anti-stall gear which not merely indicated that the aircraft was stalling but actually pushed the control stick forward. Even earlier than this there was in France the "Girouette Constantin," which was afterwards developed to include lateral control as well.

It seems that the American device, produced by the Safe Flight Instrument Corporation of New York, has "caught on." Already more than 1,000 of the instruments have been fitted in private aircraft, and the first airliner type to be so equipped is a Convair 240. After tests, it is expected that all the machines of this type will have the device. That will mean its use on Pan American, American Airlines and ten other routes. In addition, the S.F.I. has been used extensively on Navy fighters during tests on flight characteristics.

M. Georges Houard, editor of our French contemporary *Les Ailes*, has recently been fighting a war with the authorities, who, like Queen Victoria, "are not amused." They tested the Constantin vane and agreed that it did all that was claimed for it on relatively slow aircraft, but was not quite so satisfactory on fast types. Since M. Constantin first produced his scheme, the automatic pilot, it is argued by the Service Technique, has become generally adopted and has given full satisfaction.

We confess that we have a good deal of sympathy with M. Houard in his campaign for a re-trial of the "Girouette Constantin." The American stall-warning device is, apparently, satisfactory on high-speed types, and if it will sound a buzzer and light a lamp, there does not seem to be any obvious reason why it should not equally well operate a relay valve.

It appears to us that merely to use the vane in a warning device is going only part of the way. It cannot be argued that to make the vanes operate the actual flying controls would entail a great deal of weight and complication. The Savage-Bramson anti-stall gear was fitted experimentally in one of the late Major Jack Savage's sky-writing S.E.5 biplanes. True, it operated the elevator only, but its weight was something like five pounds! Its component parts were few and simple: a bottle of compressed air, a double-acting pneumatic relay, a working cylinder, and the release valve operated by the vane.

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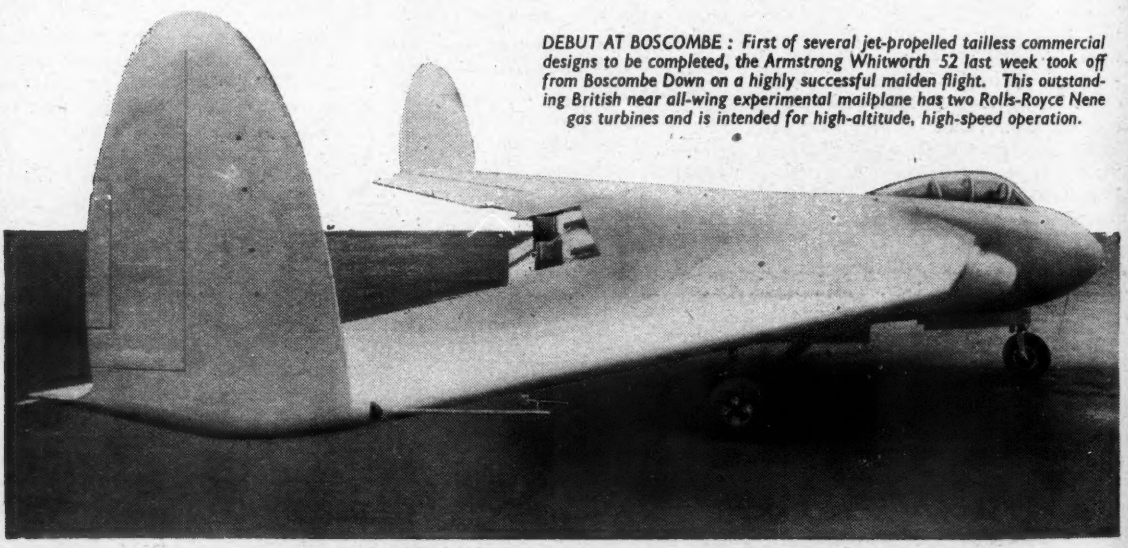
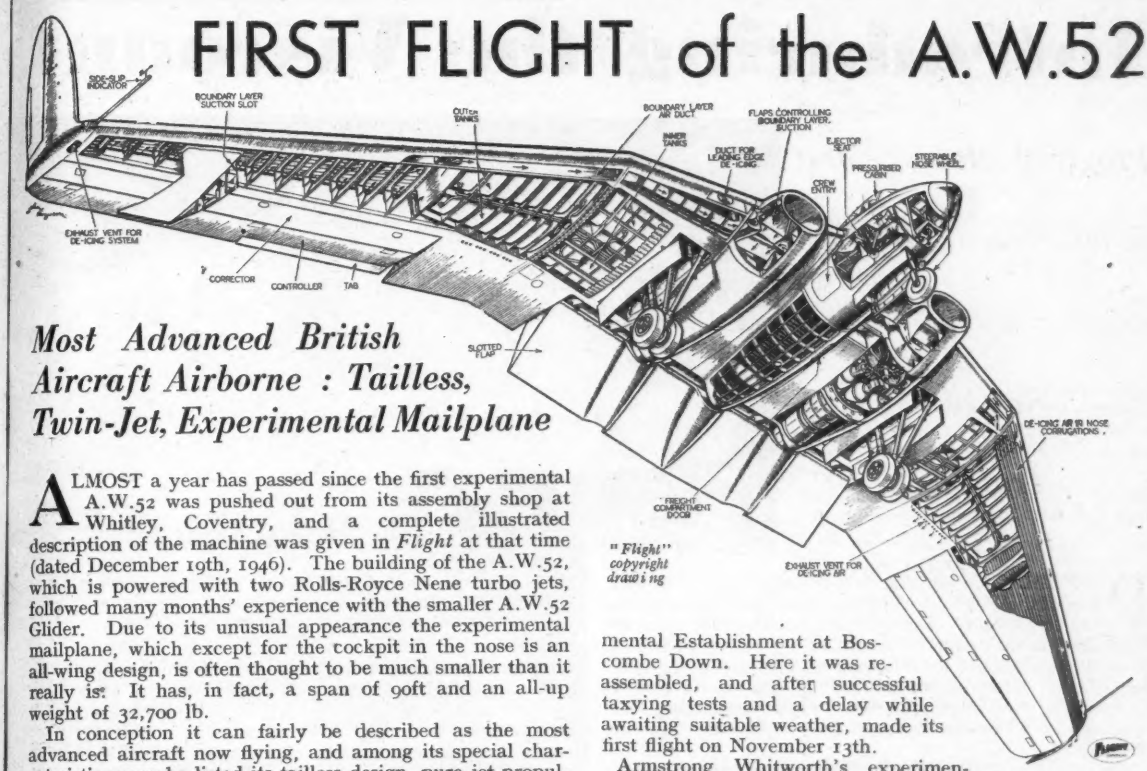


DEBUT AT BOSCOMBE: First of several jet-propelled tailless commercial designs to be completed, the Armstrong Whitworth 52 last week took off from Boscombe Down on a highly successful maiden flight. This outstanding British near all-wing experimental mailplane has two Rolls-Royce Nene gas turbines and is intended for high-altitude, high-speed operation.

FIRST FLIGHT of the A.W.52



Most Advanced British Aircraft Airborne : Tailless, Twin-Jet, Experimental Mailplane

ALMOST a year has passed since the first experimental A.W.52 was pushed out from its assembly shop at Whitley, Coventry, and a complete illustrated description of the machine was given in *Flight* at that time (dated December 19th, 1946). The building of the A.W.52, which is powered with two Rolls-Royce Nene turbo jets, followed many months' experience with the smaller A.W.52 Glider. Due to its unusual appearance the experimental mailplane, which except for the cockpit in the nose is an all-wing design, is often thought to be much smaller than it really is. It has, in fact, a span of 90ft and an all-up weight of 32,700 lb.

In conception it can fairly be described as the most advanced aircraft now flying, and among its special characteristics may be listed its tailless design, pure jet propulsion from "buried" power units, pressurization for very high altitude, unique corrector/controller flying control system, thermal de-icing, automatic boundary layer control by suction, and pressure-balanced control surfaces.

When, after completion, an unforeseen fault was discovered in the control operating system, the delay caused was as great a disappointment to all those interested in aviation as to Sir Ben Lockspeiser and to Mr. John Lloyd (chief designer) and his staff. The particular form of wing construction for which contour accuracy within 1/2,000th inch is claimed, naturally did not lend itself to quick redesign of control runs. However, the work was tackled energetically, and approximately two months ago the machine was transported in units to the R.A.F. Experimental Establishment at Boscombe Down. Here it was reassembled, and after successful taxying tests and a delay while awaiting suitable weather, made its first flight on November 13th.

Armstrong Whitworth's experimental test pilot, S/L. E. G. Franklin, flew the machine and was so satisfied with the controls that he remained airborne for a considerably longer period than is usual for a first test flight. On landing he expressed his pleasure at the way the A.W.52 had handled, and it is now expected that it will be flown to the company's airfield at Bitteswell during the next week or two.

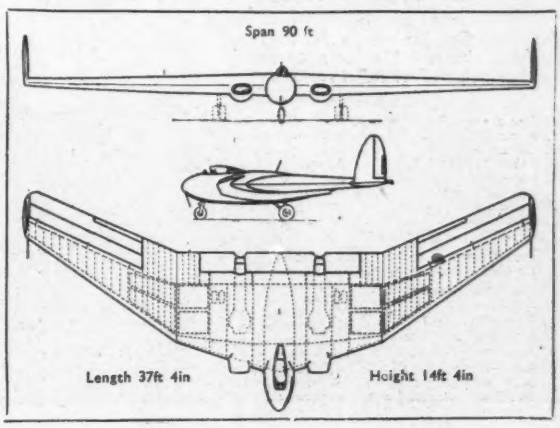
The second A.W.52 is practically complete in the factory at Whitley, and is only awaiting confirmation that the corrector and controller system on the first machine has proved satisfactory before being finished off.

"Flight" photograph.

S/L E. G. Franklin, Armstrong Whitworth's experimental test pilot who made the first flight on the A.W.52. (Spec E9/44).

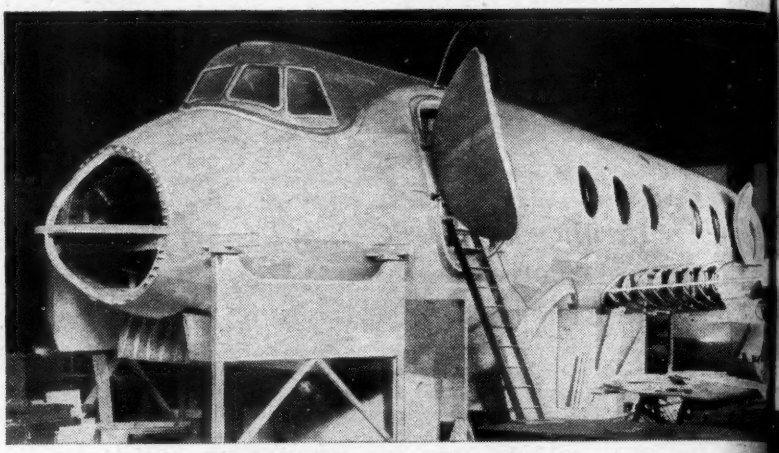
ARMSTRONG WHITWORTH 52
Two Rolls-Royce Nenes (5,000 lb static thrust each)

Wing area	1,314 sq ft
Wing loading	24·8 lb/sq ft
Fin and rudder area	37·53 sq ft per side
Sweep back nose to knuckle	17 deg 34 min
Sweep back knuckle to tip	34 deg 6 min
Lift coefficient (max.)	1·6
Total weight	32,700 lb
Freight capacity	300 cu ft (4,000 lb)



Introducing the Viscount

Progress Report and Brief Preliminary Description of the Vickers 32-43-Seater Civil Transport



The two large elliptical doors and the large cabin windows are particularly noticeable in the full-scale mock-up. The mounting for the port inner power unit can also be seen.

PROBABLY for the first time in this country, a user, one of the English airline operators, has been afforded the opportunity of co-operating to the full, from the beginning, in the design of an aircraft. Vickers and B.E.A. have set out to build the Viscount as a suitable aircraft for the efficient operation of Continental routes, for a span of operating years starting in three to four years' time. The Viscount is, therefore, designed as a replacement for the Viking.

The Ministry of Supply originally ordered two prototypes to be powered by airscrew turbines. Vickers-Armstrongs appreciated, however, that there were three possible airscrew turbines which could be used in an aircraft of the type required: the Rolls-Royce Dart, the Armstrong Siddeley Mamba, and the Napier Naiad, and decided to build a third Viscount as a private venture, so as to provide a prototype aircraft for each type of engine. The Rolls-Royce Dart has made good progress. It has been run for a thousand hours, and although designed to produce the equivalent of 1,000 h.p., it is capable of development up to 1,400 h.p. The Dart and Mamba have both flown on test, in the nose of a Lancastrian, and the Naiad, which is a larger engine designed to provide the equivalent of 1,500 h.p., is also progressing.

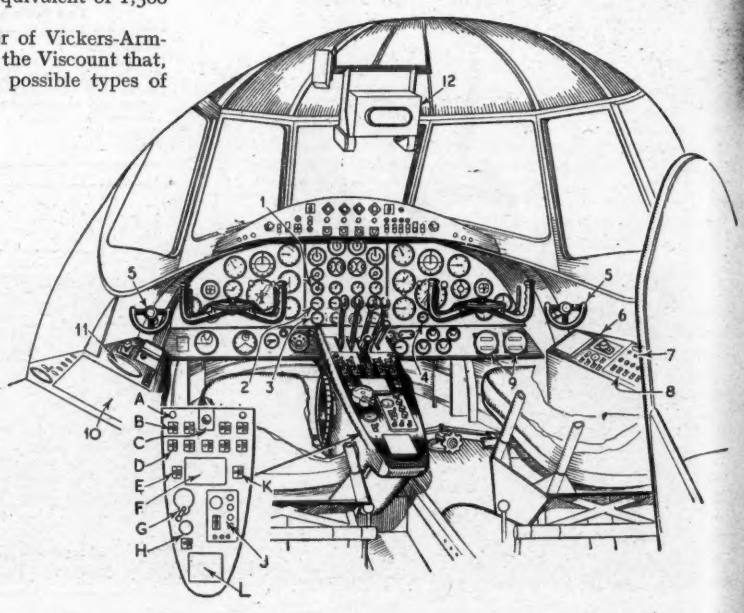
Mr. G. R. Edwards, the chief designer of Vickers-Armstrongs, decided early on in the design of the Viscount that, since there was to be a choice of three possible types of engines, they should in fact be as nearly as possible interchangeable. Such an innovation required similar installation characteristics. He gathered together the engine manufacturers, and between them they decided on a common engine nacelle and structure upon which could be mounted each type of engine for installation in the Viscount, a development which is not only of technical interest, but one which may prove to be of considerable economic value.

Early Test Flights

In about two months the drawings for this new aircraft will be finished, and progress from that moment will depend largely upon the success of the engines in the air, but Rolls-Royce are confident that the first four Darts will be delivered to Weybridge in time for the Viscount to be completed and ready to fly about midsummer.

The Viscount is not revolutionary in design, and contains many features which are now accepted as normal require-

The general cockpit layout is orderly and well planned. The mantelpiece type dashboard above the instrument panels holds the feathering, fire extinguisher and many other switches. The more interesting controls and indicators are shown.

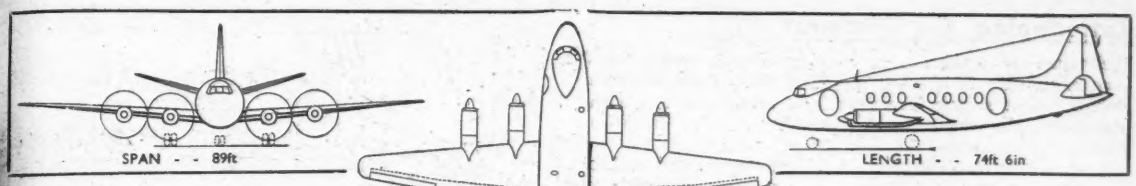


COCKPIT

1. Torque pressure.
2. Burner pressure.
3. Oil pressure.
4. Cabin "height."
5. Nose-wheel steering.
6. Inter-com. control.
7. Pressure system emergency switches.
8. Thermal de-icing.
9. Fuel flow-metres.
10. Cabin pressure unit automatic control panel.
11. Ground-setting pressure indicator.
12. Miniature Gee.

CENTRAL PEDESTAL

A. Push-button control for auto. pilot.
B. Four high-pressure pump switches and indicators.
C. Undercarriage retraction lever.
D. Four Fire-wall fuel cock switches, one crossfeed switch and indicators.
E. Emergency undercarriage retraction lever switch and indicator.
F. I.L.S. control panel.
G. Rudder trim.
H. Aileron trim indicator and switch.
J. S.E.P.I. control panel.
K. Power supply changeover switch.
L. S.B.A. control panel.



ments for passenger-carrying aircraft, but it will certainly be the first British airline aircraft to fly which has been designed for airscrew turbines.

Mr. Edwards considers that turbines with centrifugal compressors, such as the Dart, are likely to be used operationally before those with axial compressors, since the solution of engine icing and other problems appear to be much more simple with the centrifugal type. He considers that the use of axial-compressor turbines before such problems are fully solved would seriously prejudice their future.

The fuselage has been designed on the double-curve cross section principle. The wing and fuselage construction follow the same general systems as those on the Viking, but the two types have no components in common. Whilst making comparison with the Viking, it is interesting to note that the price of the Viscount structure per pound of structure weight is not expected to be more than slightly above that of the Viking. The ultimate price will depend largely upon the cost of the power units.

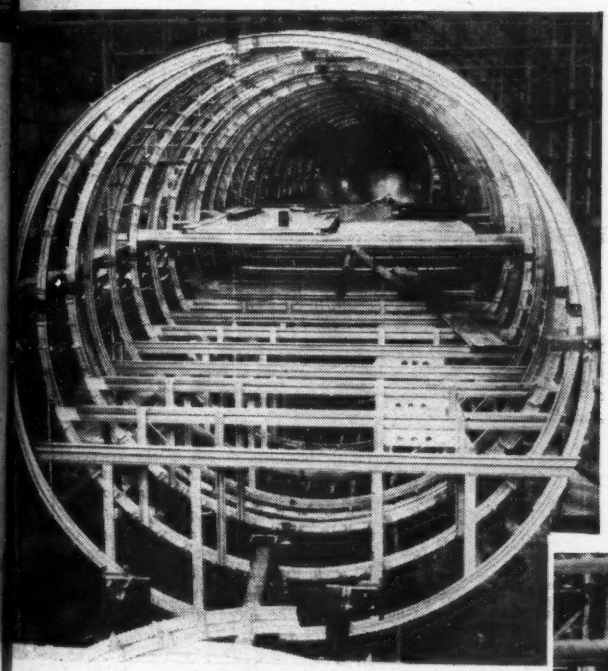
The cabin will be pressurized throughout and capable of maintaining an equivalent height of 8,000ft when at an actual operating height of 24,000ft. Vickers have already had considerable experience of pressurization, having built a hundred Wellingtons with pressurized cabins during the war. The actual system has been designed by Mr. J. R. Leach, of Vickers, but incorporates some components by outside specialists. Rootes-type blowers are driven by the two starboard and the port inner engines, and after careful routeing the air is fed in through ducts running down the inside of the fuselage. Combustion heaters are not fitted, but the heat generated by compression of the air by the blowers is used and so controlled that the actual air for pressurization is maintained at the desired temperature.

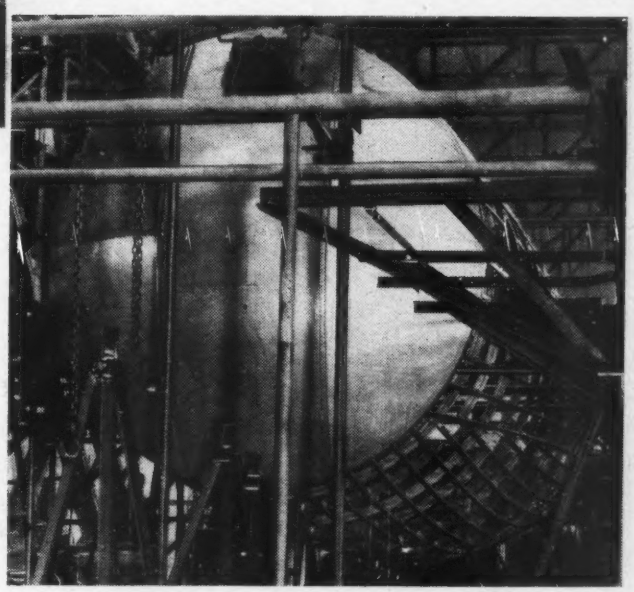
From the individual blowers the air passes through silencers, spill and non-return valves. The channels then join and the air passes through a mass-flow metering device to the temperature control apparatus, which consists of air-to-air heat exchangers, and a turbo-expander refrigeration unit. Air then passes through further silencers into the cabin via either the main low-level ducts or the head-level punkah louvres. When the main system is not in operation a fan supplies ventilating air through the punkah louvres. Normal extraction is by means of a roof duct which leads to the lavatories and finally to the main escape valve in the belly of the aircraft.

Air Conditioning on the Ground

Units of the temperature-control system are operated automatically by one electric actuator or manually by one lever, so permitting simplified control over the complete temperature range. There is a specially controlled system for refrigeration and dehumidification, but humidification has not been included since the makers consider it unnecessary. The conditioning system may be put into operation whilst the aircraft is still on the ground, without running the engines.

Air accidents have demonstrated all too frequently the tendency of modern aircraft, after crashing, to burst into flames due to the rupturing of fuel tanks. The Viscount





Looking aft through the Viscount fuselage. Space beneath the floor will be taken up with pressurization and de-icing equipment.
(Right) As may be seen from this photograph of the aft pressure bulkhead and fuselage, the first prototype is well under way.

Introducing the Viscount . . . . .

fuel tanks are of the flexible crashproof type, and Vickers' own experience of a crash in which these tanks were involved confirms their view that they will successfully withstand impacts which would normally rupture metal or integral type tanks.

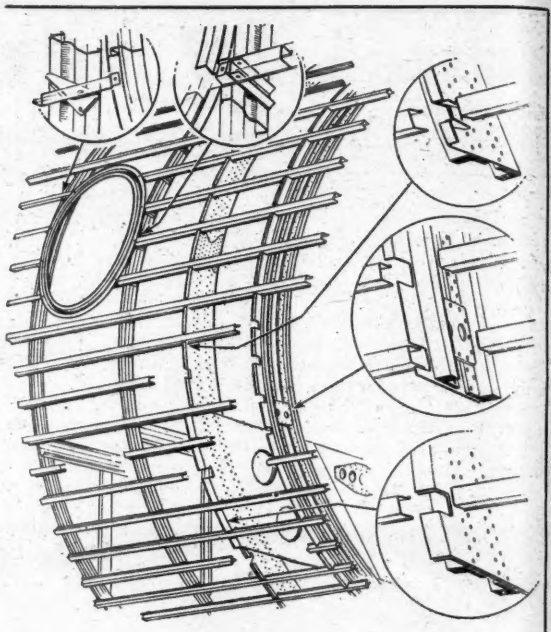
The undercarriage is of the nosewheel type, and each of the main legs carries two wheels. They retract forwards, in about six seconds. The airframe has been designed to withstand any vertical gusts which are likely to be met at the operating height, and consequently gust alleviators have not been incorporated.

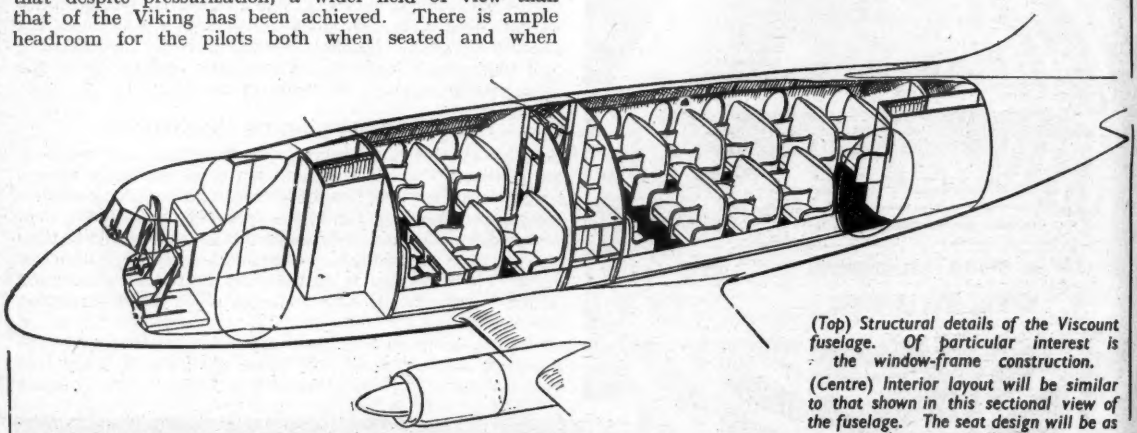
Safety Measures

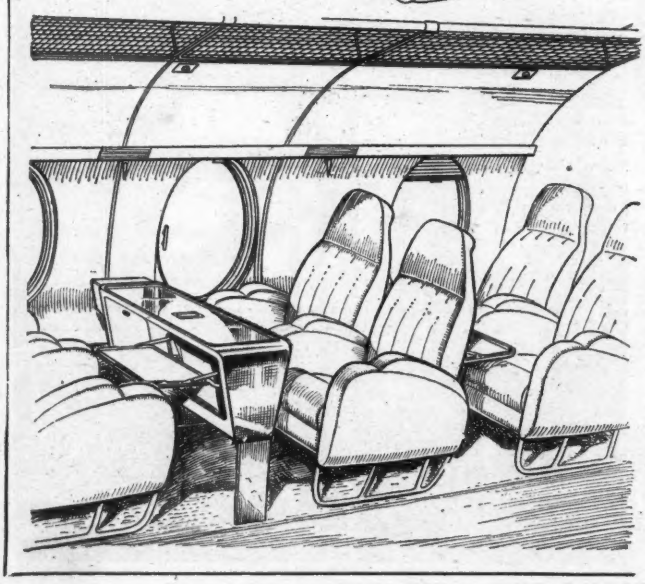
Anti-icing has been designed on the thermal system. Exhaust gas is collected from the jet pipe of the turbines, mixed with air and passed through the wings and tail unit, the temperature naturally being controlled.

Double slotted flaps have been included to reduce the landing speed, and provision will be made for reversible airscrews, but the first aircraft will not be so fitted, owing to the already complicated airscrew controls on turbines, and further development will be necessary before it can in fact be included.

The forward view from pressure cabins is generally rather poor, but Vickers have set out to make the Viscount's view forward at least as good as that on the Viking. To accomplish this, the canopy has been designed as an excrescence on the natural shape of the fuselage, with the result that despite pressurization, a wider field of view than that of the Viking has been achieved. There is ample headroom for the pilots both when seated and when







(Top) Structural details of the Viscount fuselage. Of particular interest is the window-frame construction.

(Centre) Interior layout will be similar to that shown in this sectional view of the fuselage. The seat design will be as in the separate illustration.

(Bottom) Large, high-backed seats and a new table have been especially designed. The large windows will provide an excellent view from the cabin.

standing at the rear of the crew compartment.

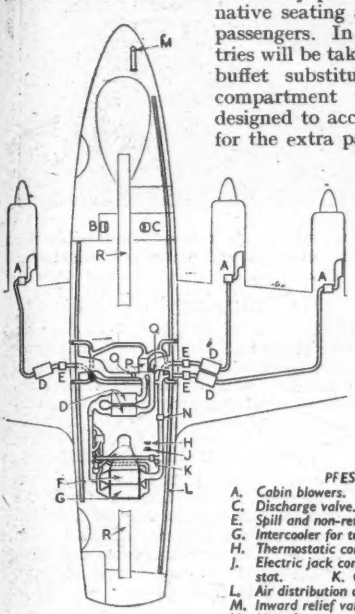
Incidentally, the cabin has been fitted with large elliptical windows, which will allow passengers a particularly wide view from their seats. After much study, Vickers found that an elliptical hole required the smallest weight replacement to make an effective seal for a pressurized fuselage. A single reinforcing member around the hole was found to be adequate.

The cabin has been designed to accommodate a Captain pilot, second-pilot navigator, radio officer, and steward. There is no navigation station, but a folding table on the starboard side of the second pilot's seat is easily brought into position for writing, and the starboard control column can be disconnected. The pantry is amidships in the cabin. A rather neat innovation is the loading hole in the floor of the pantry to allow loading and unloading of a trolley beneath the aircraft. The automatic pilot is the new Smith S.E.P.1, and standard equipment will include the Instrument Landing System, and miniature GEE suspended

Introducing the Viscount . . . . .

from the roof between the two pilots. Two very large doors, one in the forward position and one aft (both on the port side) allow quick loading and off-loading of passengers.

The normal 32-seater version will be known as the Mark I, and a Mark II is already planned providing alternative seating arrangements for 43 passengers. In this model the pantries will be taken away and a small buffet substituted. The luggage compartment would also be redesigned to accommodate baggage for the extra passengers.

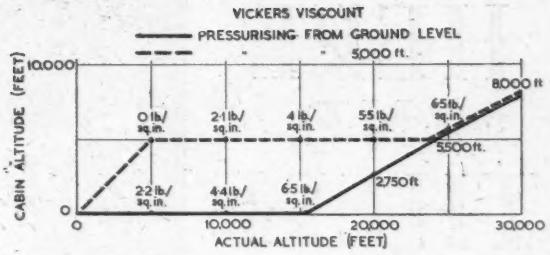


The pressurization system shown diagrammatically.

PRESSURE SYSTEM.

A. Cabin blowers. B. Safety valve.
C. Discharge valve. D. Air silencers.
E. Spill and non-return valves. F. Air/air cooler.
G. Intercooler for turbo-expander.
H. Thermostatic control.
J. Electric jack controlling valves and thermostat. K. Choke valve and by-pass valve.
L. Air distribution ducts in cabin.
M. Inward relief valve.
N. Mass-flow metering duct and control unit.
P. Fan. Q. Non-return valve. R. Roof ducts.

Eighteen months of development flying have been allocated so as to ensure that the Viscount is a workable proposition before it goes into service. That time has been estimated by Mr. Edwards as being necessary for airframe development alone, and is quite apart from any engine development which may be required. He hopes, therefore, that Vickers will be in a position to start a dribble of production by early 1950. There may be a few machines through before then, however, and he considers that the Viscount will be ready for operation on the routes in 1951.



Pressure within the fuselage can be maintained at either ground level up to 15,500ft actual height, or at 8,000ft up to an actual height of 24,000ft. The graph indicates the change in cabin pressure as actual height increases.

VISCOUNT Mk. I.

	Dart	Mamba	Naiad
Take-off weight (lb)	40,350	39,500	40,500
Landing weight (lb)	35,630	34,780	35,780
Take-off weight to clear 50ft (yds)	1,100	1,160	920
Landing distance from 50ft (yds)	860	845	870
Pay load (lb)	7,600	7,615	7,560
Still Air Range (Nautical Miles) No Allowances.	700 At 240 Knots	700 At 243 Knots	825 At 270 Knots

VISCOUNT Mk II (Long Range).

Take-off weight	45,000 lb
Landing weight	43,000 lb
Pay Load and Still-Air Range (25,000ft at 275 kts) at 6,180 lb	1,525 n.m.
Pay Load and Still-Air Range (25,000ft at 275 kts) at 10,000 lb	880 n.m.

That 3,000 Hours per Annum

The Danger of Very Intensive Aircraft Utilization

By E. T. HOUSE

IT is customary to-day, in air transport circles, to regard very high intensity utilization of aircraft as an essential factor of efficient operation. It is possible, however, that this enthusiasm is often misplaced, and that true efficiency is not always achieved if aircraft are used at the maximum possible rate.

First of all, it is necessary to define the meaning of the word "efficiency" as used in this context. In general, it has been customary to judge the efficiency of a business from the return obtained on financial outlay. It is assumed that, if the air transport operator provides what the public wants, the return will be adequate. Similarly, if services run late, or fares and rates are excessive through inefficient operation, people will refuse to use the service. Thus, the term efficiency can be used as a standard of balance in the old so-called law of supply and demand. In these days of semi and full nationalization, such a definition of efficiency is probably inadequate, but it will serve for the purpose of this article.

The important point, in the application of the word efficiency to aircraft utilization rate is that not only must there be an adequate return on capital outlay but at the same time, to preserve the balance, the customer must get what he wants. In the case of air transport, this will be taken to be the carriage from one place to another, of himself, his goods or his mail, with safety, punctuality, regularity and speed. This must be done at a cost which he is prepared to pay and at a time when he is prepared to travel.

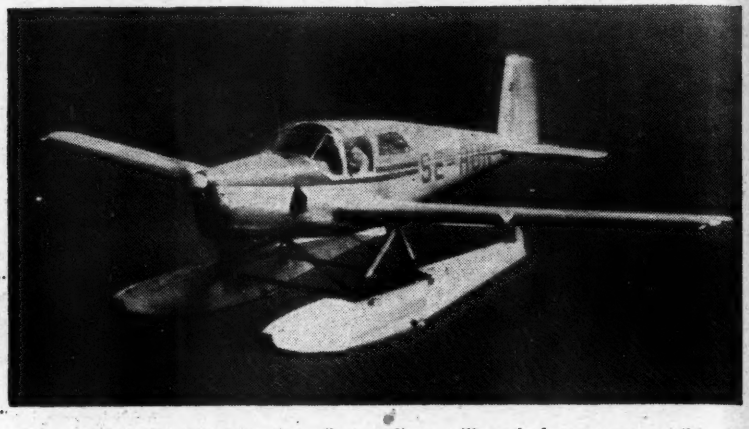
All these requirements may be affected by high utilization rate of equipment, but punctuality, regularity and cost are the most vulnerable. If quick turn-rounds at terminals are scheduled, as they must be if aircraft are worked hard, a small breakdown on one service may well result in a delay on another, or even in a cancellation. This can be summarized as lack of flexibility, and it is always a matter of greatest concern to any operator whether it is better to have more work done per unit or to have a higher standard of flexibility.

With regard to the cost involved, if something approaching the maximum amount of work is to be obtained from each aircraft, say, between 10 and 14 hours a day for every day of the year, it will be necessary to have maintenance on a shift-work basis throughout the twenty-four hours. Night work is always more expensive than day work, in wages alone, and, in addition, there are other costs to be considered such as light and heating. Furthermore, shift-work on aircraft maintenance requires a more stringent standard of inspection to cover the handing-over of work from one shift to another. This is essential in order to maintain an adequate standard of safety.

In theory it is obvious that the more work an operator obtains from his capital equipment, in particular from his aircraft, the greater must be his financial return and the more efficient his business. It should be remembered, however, that, provided average utilization rates of six to nine hours a day are achieved, the actual cost of each aircraft is insignificant, when compared over a year with that of fuel, operations, maintenance, traffic and adminis-

(*Concluded on page* 576.)

HERE AND THERE



SAFIR SEAPLANE : The usefulness of the Swedish Safir, particularly in its country of origin, will be increased by the introduction of this float-borne version. The landplane has a retractable tricycle undercarriage.

Honeymoon Service

SINCE the inception of B.O.A.C.'s Baltimore-Bermuda service in 1945, some 25,000 passengers have been flown to and from the isles. Only 3 per cent of them were on business and no fewer than 14 per cent were reported to be on their honeymoons. Fares are $70 single and $126 return. During the first six months of this year, 27,604lb of freight at 25-30 cents a pound average rate were carried on this route.

Miles Aircraft Proceedings

A PETITION for the winding-up of Miles Aircraft, Ltd., has been presented by Titanine, Ltd., and is to be heard at the Law Courts on November 24th. Miles Aircraft was founded in 1929 with a capital of £60,000, and has been built up to a business estimated to be worth over £2½ million. In *Flight* of November 6th, certain difficulties encountered by the company were reported, and the appointment of Mr. S. R. Hogg, F.C.A., as manager. Shareholders were informed that the company was operating at a loss, and Mr. F. G. Miles announced the payment of the 4½ per cent Preference dividends out of his private resources, the amount being £8,600.

Mr. Hogg stated that Miles Aircraft was seriously affected by the fuel crisis, which had a delayed-action effect, and by sharp rises in production costs.

Fairey Move Completed

FINAL assembly shops, the production flight testing section, and experimental flight of the Fairey Aviation Company's head-office works at Hayes have now been moved to White Waltham airfield, near Maidenhead. The move has been made to conform with Ministry of Civil Aviation plans to avoid extensive test flying inside the approach area to Heathrow, with the attendant danger of interference with airline operations.

Telecommunications Plan

IMPROVEMENTS in European telecommunication facilities is the object of a new "working group" set up by the International Air Transport Association. This is believed to be a sequel to the suggestion made by Mr. J. Harrison Marshall, signals controller of B.E.A., at the I.A.T.A. conference at Nice, and he is to be vice-chairman of the group. Mr. Gratz, T.W.A. Paris representative, is chairman. The group is to examine existing facilities for land-line and point-to-point communications in Europe and the Mediterranean area from the points of view of immediate improvements and long-term plans.

It is proposed to negotiate an agreement under which certain European airlines will each become responsible for civil aviation telecommunications in its own country.

Electrifying Airfields

MR. FRANK BUCKNELL, manager of the G.E.C. Aeronautical Department, is visiting operators and airfields in Sweden, with a view to interesting them in airfield electrification plans and passenger comfort aids.

Flowers for the Princess

A MASS of pink Anthurium lily blooms were flown to London from the Caribbean Flower Company of Trinidad as a present for Princess Elizabeth, via K.L.M. There were 240 blooms, each with the stem wax-sealed, and wrapped individually in tissue paper.

Liquid-Spring Undercarriages

THE Paris firm of Aerocentre has been granted a licence to manufacture undercarriages using the Dowty liquid-spring principle, and will have the sole rights to make, design and sell them in France and all French territory.

Bonanza Wing Change

BECAUSE inspections have shown that welded wings of the Bonanza are not so reliable as the riveted type, the Beech Aircraft Corporation has called in 250 Bonanzas for wing change. Although there have been no accidents attributed to the welded wings, this action is being taken by the company to safeguard owners against possible trouble in the future. All subsequent machines will have riveted wings.

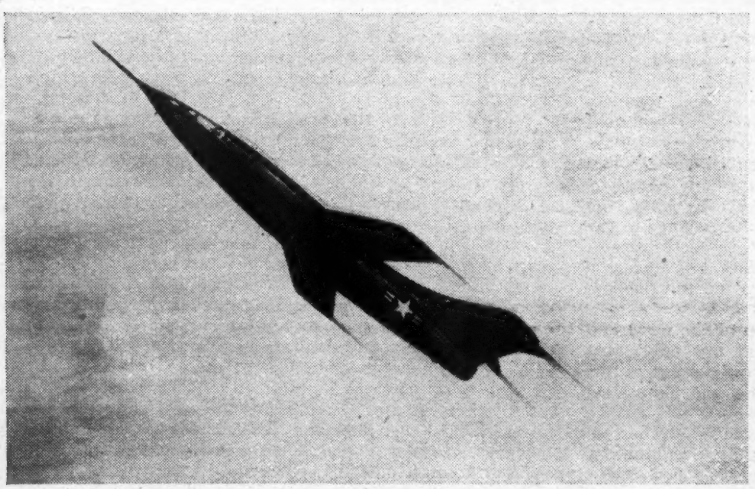
The Awful Eye

THERE is now an air police force in the Argentine, formed from the police of the Province of Buenos Aires. Equipped with 16 aircraft, five of them helicopters, the force will carry out highway and river patrols, check coastal smuggling, control air traffic and do fire-patrols over forests.

Round the World by Piper

TWO Americans are attempting to fly round the world non-stop in a Piper Super Cruiser, picking up fuel and stores at various points by snatch-hook gear.

The Piper Super Cruiser has a 100 h.p. Lycoming engine consuming 5 g.p.h. at an air speed of 100 m.p.h., carries extra fuel, and will leave Gander (Newfoundland) airport with sufficient for 4,000 miles in still air. Full radio equipment and a radio compass is carried. As soon as the aircraft is airborne it will



SONIC BARRIER EXPERIMENT. An impression of the U.S. Navy's Douglas D-558-2 Skyrocket. Its jet engine is rocket-assisted, and it is hoped that it will approach the speed of sound. Designed to take off and land under its own power, it has been built but not yet flown.

shed its undercarriage and thereafter rely on a special skid for its ultimate landing—a procedure which should, we think, not only reduce drag but also remove much temptation from the flyers' path . . . The flight is expected to take 240 hours' flying time, and possibly some spare parts will be taken up by pick-up hook at various points.

Facilities in the U.K. are to be provided by Field Aircraft Services, Ltd., Croydon, who are the import and assembly agents for Piper Super Cruisers.

Flight learns that adverse weather conditions have postponed the venture for the time being.

Nobel Prize Award

SIR EDWARD APPLETON has been awarded the 1947 Nobel Prize in physics for his work on atmospherical physics, "and especially for his discovery of the Appleton layer." His experiments revealed the existence of electrified layers in the upper atmosphere, and in particular of the layer called after him, and he showed how radio waves could be used in experiments for investigating systematically the upper atmosphere. His researches played a basic part in the evolution of radar. Since 1939 he has been head of the Department of Scientific and Industrial Research.

680 m.p.h. by Skystreak?

A FLIGHT at 680 m.p.h. by a Douglas Skystreak, in the presence of members of President Truman's Air Policy Board, is reported. It seems that the flight was not officially timed.

Airway's Aid for Britain

TO raise money for gift parcels to Britain, Tasman Empire Airways is to make a flying boat available for flights over Auckland. Petrol costs are being borne by the company, and air and ground crews have volunteered to give their services free, so that the whole amount raised in fares can be devoted to the purchase of these food parcels. The aircraft used is expected to be the Aotearoa, a flying boat which has had seven years' service and is due to make her last flight some time this month.

Cartridge Starter

A SMALLER version of their cartridge engine starters has been developed by the Plessey Company. Weighing 10lb, it imparts a 400, 500 or 600 degree turn to the engine at a torque of 650, 550 or 450 lb-ft. It has been developed primarily for motor bus diesels, lifeboat and industrial engines, but has the torque to deal with the smaller aircraft engines up to 200 h.p.

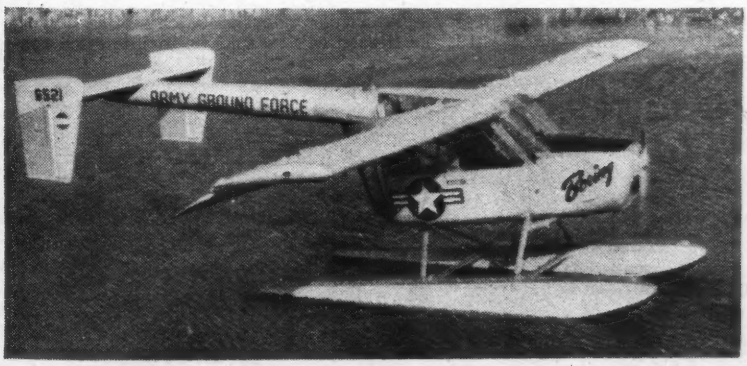
DUMMY. A dummy Mamba airscrew turbine on an Aerovan, used to develop the best nacelle arrangement for the projected Mamba Marathon. The over-wing jet pipe is intended to overcome noise and fire-risk in this passenger aircraft.

2 Years by Land —8 Hours by Air

NEGOTIATIONS with the New Zealand government for the carriage of fish from New Zealand to the Sydney markets, and with Queensland for the freighting of beef carcasses from the Northern Territories to Brisbane, have been started by the newly formed L.A.M.S. Australia, Ltd., company Flying the carcasses would take 8 hours; overland droving, it is stated, takes two years.

Capt. G.S. Brown, of B.O.A.C., who has completed 2,000,000 miles of Service and civil flying.

The company has received two of the six Haltons to be used on Australian services, and the others are arriving at three-week intervals. Formed with a capital of £A500,000, its base is at Scholefields Airport, close to Sydney.



LANDPLANE OR SEAPLANE. The American Army's Boeing XL-15 can be used as a landplane or seaplane. As a landplane it can be towed by a jeep at 40 m.p.h. with wings folded. As a seaplane it is carried in a 2½-ton truck. In this version, the landing speed is 35 m.p.h.

News in Brief

The Bristol Freighter *Merchant Venturer* after a successful 35,000-mile demonstration tour of Australia and New Zealand is now in charter service with Ansett Airways Pty. Ltd.

* * *

Capt. G. S. Brown, of B.O.A.C., has completed 15,000 hours flying, during which he has covered over 2,000,000 miles. In the 1914-18 war he was in the R.N.A.S., from 1921 to 1926 in the R.A.F., and from 1927 to 1931 took part in pioneer flying in Australia with the R.A.A.F. and West Australian Airways. From 1932 he flew with Portsmouth and I.O.W. Airways and after two years with Misr. Airlines joined Imperial Airways in 1935. He now commands a Hythe class flying boat on the B.O.A.C. Poole-India route.

Mr. Gerald Steel, now joint managing director of the United Steel Companies Ltd.

* * *

Mr. P. H. Stokes and Mr. T. Simpson, members of the Design and Experimental Department of H. M. Hobson, Ltd., have been made directors of Integral, Ltd.

* * *

B.E.A. issued an autumn time-table for the Channel Islands services. The time-table is "valid from 6 October to 1 November, 1947, until further notice." Perhaps "without prejudice" should have been added.

* * *

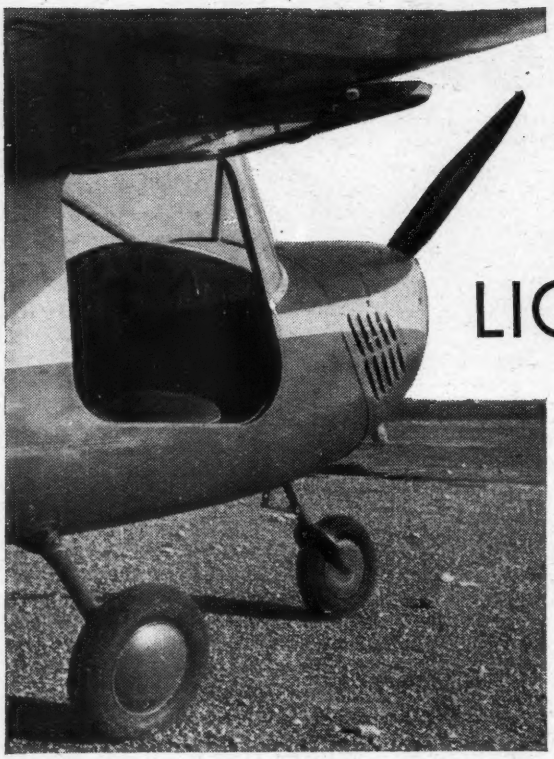
Mr. T. Frazer, a director of Metropolitan-Vickers, was recently invested with the C.B.E. by H.M. the King.

* * *

Mr. J. L. Graham, director of overseas sales with the Dunlop Rubber Co., Ltd., has retired owing to ill-health.

* * *

A famous "sight" for engineers—the old beam engine which worked at East Pool mine, on the Truro-Penzance road—is to be preserved by the Cornish Engines Preservation Society. It was acquired for £250, and an endowment appeal is made by Mr. John Pascoe, c/o British Timken, Ltd., of which he is deputy chairman.



Note in this view of the Aermacchi M.B.308 how the cabin door folds against the under surface of the wing.

Unconventional but Attractive Private-owner Aircraft by Several Makers

LIGHT and ULTRA-LIGHT from ITALY

By WILLIAM GREEN

ALTHOUGH still suffering from the serious damage wrought by the passage of the war through Italy, the Italian aircraft industry is now slowly emerging from the chaos, firmly determined to regain the position it once held in European aviation. Naturally, numerous difficulties have still to be contended with, especially regarding the construction of medium-sized and large aircraft, and it is mostly in the light plane category that new Italian prototypes are appearing as yet.

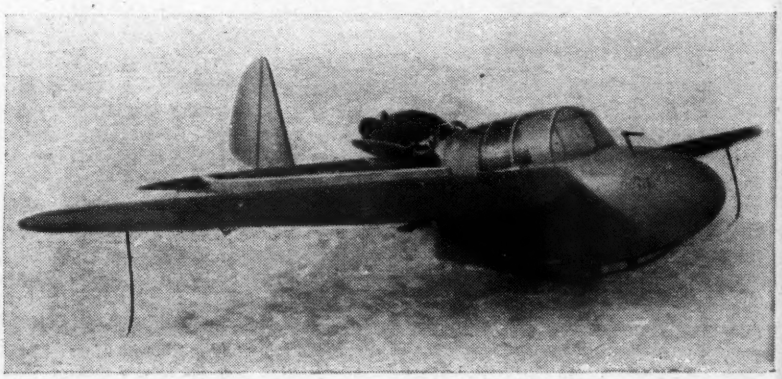
The activities of the Societa Aeronautica Italiana Ing. A. Ambrosini & C., of Milan, cover a very wide field, and include the production of aviation fuels and lubricants, aero engines, aircraft components, instruments and complete aircraft. In 1938, the company designed and built the S.A.I.2S four-seat light cabin monoplane which bore a superficial resemblance to the Percival Vega Gull. Obviously developed from the 2S, the company has recently announced the completion of its first post-war design, the S.1001 Grifo. Still bearing the resemblance to the Vega Gull series, the Grifo is a pleasantly clean all-wood cantilever monoplane powered by a 130 h.p. Alfa 110-1 (licence-built Gipsy Major S.1) engine, and intended for sporting and touring. Alternatively, the Grifo can be powered by engines up to 220 h.p., particularly suitable types being the Gipsy Major 10 and the Cirrus Major.

In the Grifo, the designer has endeavoured to simplify structure, accessories and fittings to a high degree, reducing maintenance problems to a minimum. For this reason a fixed tail wheel undercarriage has been adopted, the designer evidently considering the additional drag incurred to be more than compensated by the reduction in the maintenance required for a retractable undercarriage. Structurally, the Grifo is very simple; the fuselage is a wooden monocoque and the wing is built as a complete unit and has one main and one auxiliary spar. The Alfa engine develops 130 h.p. for take-off, and drives a two-bladed wooden airscrew with a manually operated pitch control. Beneath the rear cabin seat is a fuel tank holding 35 Imp. gal. The undercarriage consists of two oleo main legs enclosed in streamlined cowlings, and a free-swivelling tail wheel which is provided with a Dowty spring shock absorber. The cabin is neatly arranged and seats three—two in front, side-by-side, and one at the rear. Dual controls are fitted, the control wheels being of spectacle type.

Leading particulars are: span, 31ft 6in; length, 24ft 5in; height, 8ft 6in; empty weight, 1,367 lb; all-up weight, 2,116 lb; maximum speed, 149 m.p.h.; cruising speed at 77% power 130 m.p.h.; stalling speed, 55 m.p.h.; range, 497 miles.

Less Than 40 h.p.

The Alaparma (Aeroplani Livio Agostini Parma) concern has designed and built the prototypes of an interesting series of ultra-light monoplanes, intended as inexpensive and reliable fly-abouts for the amateur pilot and flying club. Primarily an experimental establishment, Alaparma intend to produce the same basic design in both single and two-seat versions, the single-seater being known as the A.M.8, and the two-seater as the A.M.10. The company will probably build small production batches of each type, after which the licence will be sold to an interested con-



The unusual little A.M.8 single-seater ultra-light monoplane has a single landing wheel and auxiliary skids.

cern. The A.M.8 is a mid-wing monoplane with a single fin and rudder carried on simple twin booms which fold immediately aft of the wing trailing edge for transportation by road. The undercarriage is unusual in consisting of a single landing wheel under the central nacelle, and skids positioned under the nose, the rear end of the fuselage, and near the wing tips. As the A.M.8 has a ground clearance of only a few inches, it can be allowed to pitch forward on to its nose skid, which will afford an abnormally short roll in the event of an emergency landing. Apart from the tolerably unconventional layout, the A.M.8 and A.M.10 are normal ultra-light monoplanes, both powered by 38 h.p. C.N.A. motors driving two-blade D.2.S. pusher airscrews. This feature, coupled with thorough cabin insulation and soundproofing, should minimize engine noises and eliminate fuel, oil and exhaust odours in the cabin, thus combining reasonable comfort with inexpensive flying. Weights and performances follow. Figures quoted in parentheses refer to the A.M.10:—empty weight, 331 (353) lb; normal useful load, 265 lb; maximum useful load, 419 lb; maximum all-up weight, 750 (772) lb; maximum speed, 115 (103) m.p.h.; cruising speed, 96 (90) m.p.h.; stalling speed, 39 (44) m.p.h. The company has also built a modified version known as the A.M.9 Tucano. This is entirely an experimental model and is intended for the testing of various features to be incorporated in the A.M.10.

Except for the lack of rear view the layout of the Aermacchi M.B.303 appears attractive.

Light and Ultra-Light from Italy.....

A Macchi in Wood

The Aeronautica Macchi S.P.A. of Varese, well remembered for its high-speed seaplanes (the best known of these, the M.C.72, raised the world's air speed record to 440.67 m.p.h., in October, 1934) has now entered the light plane market with its M.B.308. Basically a two-seat high-wing cantilever monoplane, the M.B.308 is of all-wood construction, and can be powered by any of a variety of engines in the 60-75 h.p. range. At present it is intended to install the C.N.A.-D4 or alternatively, the Continental C.65 or C.75. The cabin, seating two side-by-side, is neatly arranged and affords the occupants good forward and side view. Push-pull type dual controls are fitted. Access is through doors on each side of the fuselage; these are hinged to fold upwards and can be attached to the lower surface of the wing for taxying. The following weights and performance figures refer to the M.B.308 powered by a C.N.A-D4 engine developing 60 h.p.: empty weight, 750 lb; loaded weight, 1,235 lb; maximum speed, 115 m.p.h.; cruising speed, 99 m.p.h.; landing speed, 37 m.p.h. A production batch of 100 aircraft is projected, and having pleasing lines and a useful performance, the M.B.308 should prove popular with the schools and clubs.

Most active of Italian aircraft companies is the Aeronautica d' Italia—the aviation division of Fiat—which intends to produce a series of touring, training and sporting monoplanes designated G.41, G.42, G.44, and G.46. As yet, information is only available on the G.46, which will probably be the first of the afore-mentioned series to fly. Having the appearance of a high-performance fighter-trainer, the G.46 is basically a low-wing two-seat sporting or touring monoplane of all-metal construction, and powered by a 205 h.p. Alfa 115-1 *bis* engine. The two occupants are seated in tandem under a long glazed canopy, with dual stick-type control columns and pedals. All the main instruments are duplicated in the rear cockpit. The main wheels of the undercarriage retract inwards. Weights and performances are: empty weight, 1,950 lb; disposable load, 710 lb; loaded weight, 2,660 lb; maximum speed, 186 m.p.h.; cruising speed, 149 m.p.h.; maximum range, 600 miles.

A number of other Italian light aircraft are under development at the time of writing, but few details are available as these exist in early constructional or advanced drawing-board stages.

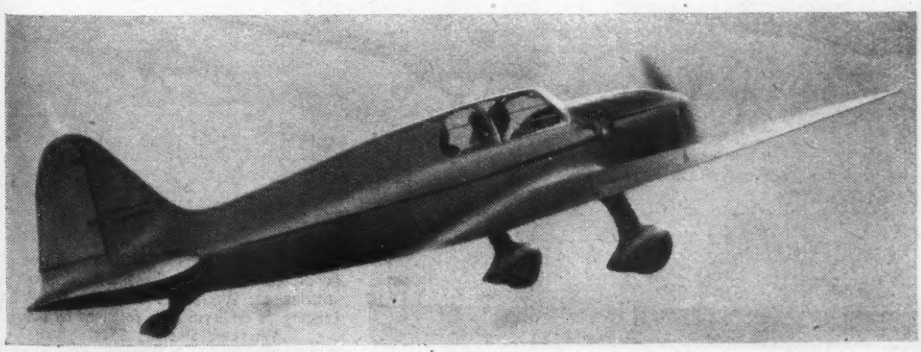
ITALIAN TYPES AT BRUSSELS

WHEN *Flight's* report of the Brussels Aero Show was written the Italian exhibits were still held up at the frontier. A short account of these is now offered to supplement our report of the show.

In addition to an Aermacchi M.B.308 and an S.A.I. S.1001, to which reference is made in the foregoing article, there was a low-wing monoplane by Francis Lombardi which, with a Continental 85 h.p. engine, carries two people at a top speed of 121 m.p.h. and has a service ceiling of 19,500ft. This type is of composite construction. Alfa Romeo showed photographs of the Bestetti, a low-wing twin-engined monoplane with retractable undercarriage and two Alfa Romeo III engines. The following models were exhibited:—

Caproni Ca 193.—A 5-seat taxi machine with a nose-wheel undercarriage and two Alfa Romeo 110.1 *bis* engines. All-up weight, 3,965 lb; range, 740 miles; cruising speed, 142 m.p.h.

Caproni Ca 191.—An 18-seat twin-engined high-wing monoplane with



Clean lines and a high finish characterize the S.A.I. S.1001, which has been named the Grifo.

Light and Ultra-Light from Italy . . . . .

retractable nosewheel undercarriage and two Isotta Fraschini Delta engines of 800 h.p. each. All-up weight, 19,360 lb; cruising speed, 192 m.p.h.

Reggiane Re. 2005.—A wartime fighter with DB 605 engine.

Piaggio P. 108 *CT.*—A transport development of the Piaggio P. 108 four-engined bomber.

Piaggio P. 135.—This twin-engined high-wing monoplane has a retractable nosewheel undercarriage and is powered by two Wright Cyclones. The cruising speed is 198 m.p.h. and the range 1,365 miles.

Piaggio P. 136.—A twin-engined gull-wing amphibian.

Piaggio P. 137.—A 4-seater resembling the French *Courlis* and powered with a Franklin engine of 215 h.p.

Breda Zappata B.Z. 308.—With four Bristol Centaurus engines this large transport weighs 88,180 lb, and in "Atlantic" condition has a maximum range of 3,100 miles. The maximum speed is 353 m.p.h.

THAT 3,000 HOURS PER ANNUM

(*Concluded from page* 571.)

tration. In particular, fuel and operations usually represent between 45 per cent and 55 per cent of the total costs. On the average airline, depreciation of flying equipment, on a five-year basis, is unlikely to exceed 6-9 per cent of the total annual expenses.

If, then, the aircraft are made to do more work, the major cost of fuel and operations will automatically increase in proportion. Maintenance costs are likely to increase at a greater rate, and traffic and administration probably at rather a lower rate, the precise amount depending on the state of the organization before the increase in work and the extent of extra sales work required. Depreciation of ground equipment is likely to remain more or less constant, but there will be a proportionate increase in the maintenance costs of such equipment. Thus it may be expected that if the rate of work of an aircraft fleet is increased from a medium to a very high figure, the cost will increase approximately in proportion.

Thus, if revenue can also be made to increase to the same extent, it will obviously pay the operator to increase his utilization rate. This is, however, most unlikely, as one of the first results of intensive use of aircraft is that, instead of operating services when the prospective passenger wants to travel, it usually becomes necessary to fit the extra operation into the maintenance and operating programme at the most unpleasant times. Furthermore, there is the certain decrease in punctuality and regularity.

Let us now consider the case of an air transport concern earning (incredibly!) gross profits of, say, 10 per cent per annum. If, by an increase in utilization of aircraft rates, the total operating costs are increased by 25 per cent, it becomes necessary to increase the revenue by not less than 23 per cent in order to earn the same gross profits. Although, under present conditions, most airline companies have a back-log of waiting passengers, under more normal circumstances additional traffic to this extent would indicate a phenomenal effort. If new routes are undertaken with the additional flying hours available, the chances of high load factors are small, except where specially favourable circumstances prevail.

It seems rather unlikely, therefore, that such an increase in revenue could readily be achieved, particularly when coupled with an almost certain falling-off in load factor consequent upon a deterioration in punctuality and unpopular operating times.

One other factor is worthy of consideration. Most airlines have a steady loss of aircraft, for one reason or another, of something like 5 per cent of their units every one to two years. In addition, there is nearly always something under repair for minor damage.

When the first aircraft is lost, it is usually possible to readjust the utilization rate and the organization and carry on as before. This may even be possible after the second loss. Thus an operator who has commenced operations with a fleet of 20 aircraft and a utilization rate of perhaps six hours a day, finishes a five-year depreciation period at a rate of $6\frac{2}{3}$ hours a day. Another operator who starts operating at a rate of 10 hours a day may simply have to cancel a proportion of his services, as his organization is likely to be at full stretch from the beginning. The solution of this difficulty by replacement of lost units through adequate insurance is frequently impracticable. Aircraft soon become obsolete, from the manufacturer's point of view, and, even if the aircraft remains in production, much time may be lost between the placing of an order and the delivery.

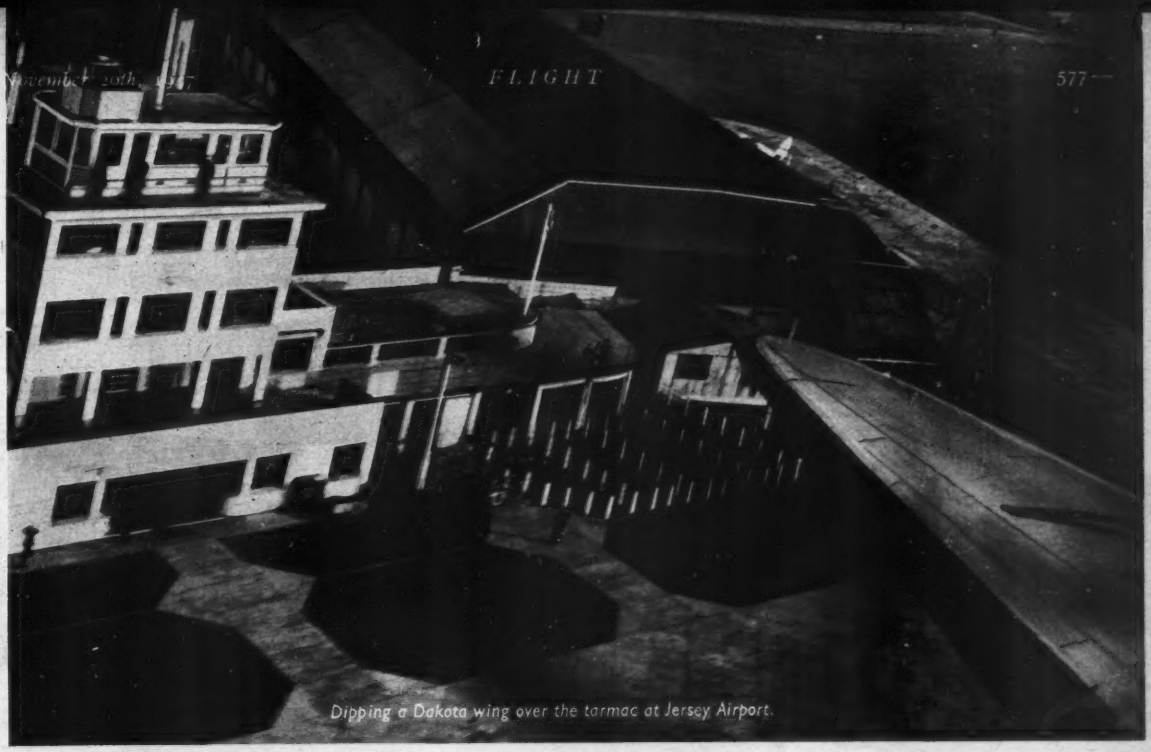
The utilization rate and the flexibility factor are, to some extent, dependent on the type of service operated. Short-distance, high-frequency services will permit a higher utilization rate than low-frequency, long-distance services, and allowances should always be made for such matters.

In general it may be said, therefore, that—

(1) The rate of utilization of aircraft should be fairly high but not the absolute maximum possible, as it is essential to have some flexibility of operation.

(2) Lack of flexibility is likely to result in adverse publicity because of a resultant lower standard of punctuality and regularity, together with unpopular times of operation. In addition, maintenance costs will be higher. Thus the net result may be a reduction in mean load factor with a possible reduction in gross profits.

FOR CORPORATION CIRCLES: Three helicopters flying at the B.E.A. demonstration at Westland's airfield, Yeovil. Leading is an Irvin Bell, followed by two Westland Sikorsky S51s.



Dipping a Dakota wing over the tarmac at Jersey Airport.

INTERNAL AIRLINES SYSTEM

THE third article on Britain's internal services by Roy Pearl, is a review of the Channel Islands Area. Whilst perhaps not internal, the Islands' air routes are flown by the English Division of B.E.A., and the airports, although independent, are similar in operation to those on the mainland.

Illustrated by "Flight" Photographs.

IN the best six months of the holiday season this year, the Channel Islands cross-Channel boats carried 232,307 visitors from the United Kingdom, such is the popularity of the Islands as a holiday centre. That traffic is seasonal, but there are also many Islanders who are anxious to keep in close contact with the mainland, and who are constantly travelling across. Quick, efficient transport is necessary for both. The journey from Southampton by sea takes 6¾ hours to Guernsey and 10¼ hours to Jersey. From London to either takes 3 hours longer.

By air from Southampton the actual travelling time is only one hour, and the total time from the centre of London to St. Helier is about 2¼ hours. It may be said that there are few, if any, routes in the world—and certainly in the U.K.—with heavy passenger traffic, which show better the advantages of flying. From April to September this year British European Airways carried 73,017 passengers to and from the Channel Islands area, and many hundreds of applicants for seats were disappointed each week, so great was the demand. These figures, and those which will be quoted later for the traffic at various airports, illustrate the popularity of the air route, even at this time when air travel is still a comparative novelty.

Associated with this route is the important airport at Southampton, situated strategically in a commanding position as a junction and clearance airport on the South coast, on which routes from the North, the Midlands, Wales and the West Country can converge. It serves as a convenient jumping-off point to the Islands and, of course, to the Continent. Southampton must be considered as an essential link in the connections to the Channel Islands, and will play an increasingly important role as air traffic develops.

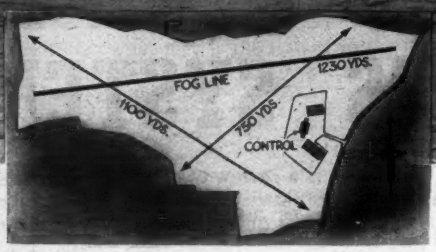
The history of the Channel Islands air routes is probably better known than that of most others. Briefly, then, Jersey Airways was formed in 1933, and services were operated from the beaches in St. Aubin's Bay. Guernsey Airways started operations about a year later. After the war the two companies amalgamated to form Channel Island Airways, and operated the same routes to the mainland and between the Islands with Rapides and a Bristol Wayfarer hired from the manufacturers.

With the nationalization of all British scheduled airline operations and the passing of the necessary legislation for application of the Civil Aviation Act, with modifications, to the Islands, British European Airways were made responsible for scheduled air services, and the present organization constitutes an operational area, with headquarters at Jersey but responsible to the English Division. The last Channel Islands Airways service flew on April 1st this year. The airport situation is quite different from that on the mainland since the Ministry of Civil Aviation does not own or control them.

Jersey Airport.

The airfield at Jersey was opened in March, 1937. It is owned by the States of Jersey, and administered and controlled by the Harbours

Commander J. M. Keene-Miller, O.B.E., Area Manager, Channel Islands.



The elegant building at Jersey. The "pens" on the right are for segregating passengers during busy periods. The layout of Jersey Airport can be seen in the map on the left. Further extension is possible to the north-east.

INTERNAL AIRLINES SYSTEM . . .

L. Roche, Jersey Airport Commandant.

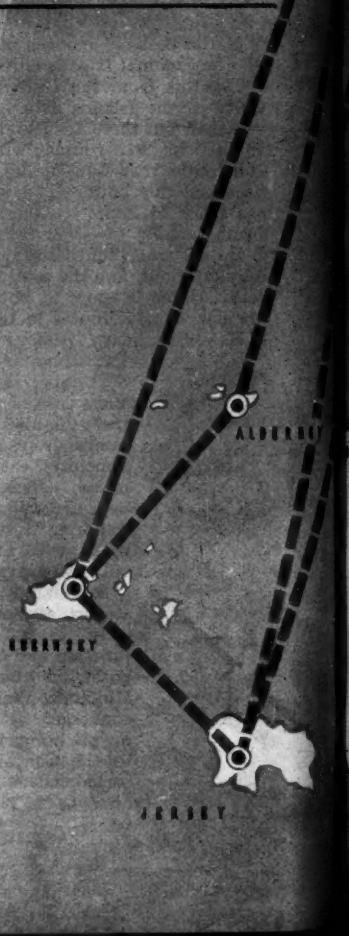
(Above) W. L. G. Butt, B.E.A., Station Superintendent, Jersey. (Below) R. T. A. Dalton, Senior Controller, Jersey.

and Airport Committee, who are responsible for radio, meteorology, air traffic control, all ground services and airport maintenance. Control systems and orders initiated by the Ministry of Civil Aviation are normally followed closely, but their application to local conditions and circumstances is undertaken by the States. The airport, which is at the West end of the Island, is perched at the top of the cliffs, 290ft above the sea, and five miles from St. Helier. There are no runways but the excellent grass surface is well drained and makes a good landing ground.

During the summer months, flying is frequently hindered by low stratus which forms quickly over the Islands, and while the weather is clear in the vicinity, landing and taking off presents a problem to the operators. The prevailing wind is, as may be expected, from the West, and fortunately the longest run is in the East/West direction. Extensions were started before the war, and the Germans, when in occupation, insisted that they should be finished. The East end of the runway has consequently been extended to provide a total run of 1,250 yards, and a further 200 yards extension may be made.

The North/South direction creates the weakness in the airport, since any extension to the South would require major levelling operations to be undertaken; while to the North the demolition of buildings would be necessary. A compromise would be to extend in a north-easterly direction to provide a total run of about 1,200 yards, and landings in six directions could even be obtained by diverting a road. The airport is now nearly up to I.C.A.O. Class E standards, and not all the previously mentioned extensions are necessary to bring it up to that standard.

The airport buildings, which contain offices for all services, passenger handling, Customs, and flying control, are elegant, well-planned and practical. A balcony runs right round the building, to which the public are permitted access free of charge, and during the summer months



Alderney Airfield with runs marked by inlaid concrete blocks. A daily service runs from and to Guernsey.

Passengers bound for Northolt embarking at Jersey in October sunshine.

many visitors have watched flying activities at Jersey.

Figures for the first year of operation, from March, 1937, to February, 1938, showed that air services were already popular. 34,500 passengers were handled, and that figure was second only to Croydon. In 1938, passengers numbered 35,000. In the incomplete year of 1939 it was 28,200, and last year, over the same eight months, the number was 41,631. This year, from January 1st to August 31st, 75,389 passengers passed through the airport. Once again considering only the first eight months of each year, scheduled services in and out numbered 4,907 in 1939; 7,557 in 1946; and 9,962 in 1947.

Charter company movements have increased from 145 in 1939 to 2,072 in 1946, and to 5,060 this year. The greatest number of aircraft movements on any one day was 218 on August 31st this year, and it is rather interesting that on each Saturday for the three months during the summer there were no fewer than 200 movements. The average number of movements per day can be said to have risen from 20.8 in 1939 to 39.6 in 1946 and to 61.8 in 1947. The passengers handled per day show a similar increase, and this year the average has been more than 300 per day. These figures surely indicate the need in the future for adequate regular services with suitable aircraft.

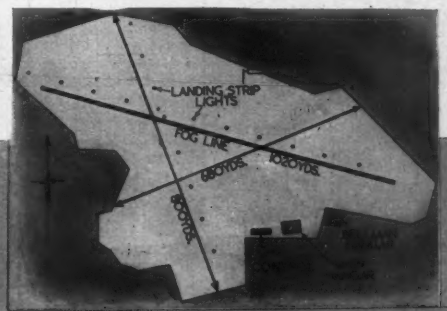
Radio at Jersey includes MF/DF and HF/RT. VHF/RT is to be installed quite soon, another frequency on MF/DF is expected at the end of the year, and S.B.A. on the East/West landing run should be functioning in a few months. An omnidirectional beacon is to be installed 1½ miles South-West of the airfield, on an old German flak tower. Direct revenue from the airport last year amounted to £11,000.

The B.E.A. organization under Commander J. M. Keene-Miller functions from Jersey. Crews are based on the Island under Flight Captain E. W. Jordan, and the maintenance organiza-

K. Stuart-Smith, Guernsey Airport Commandant.

F. J. Ferbrache, B.E.A., official in charge at Guernsey.

Our B.E.A. hostess serves coffee in the Dakota soon after take-off.



On the right, a map of the airfield at Guernsey and, below, B.E.A. Rapides in front of the terminal building.

Handling incoming and outgoing passengers under difficult conditions in the makeshift buildings at Southampton.

R. T. Halliwell, Air Traffic Control Officer, Southampton, looks out on to the airfield from the control tower.

P. Whitford. The M.C.A. representative pauses whilst talking to E. L. Cosgrove, B.E.A. official in charge, Southampton.

INTERNAL AIRLINES SYSTEM . .

tion is capable of doing Cs of A on all Rapides flying on Island services. The Corporation naturally handles its own passengers with its own staff, but the States have made a rule that all charter companies using the airport are to be represented, either by one of the resident charter companies or by the resident agency, Bellingham, who have loaders and the requisite organization. Confusion and the unpleasant experience for passengers of feeling uncared-for has consequently disappeared.

Island Air Charters and Air Transport (Charter) (C.I.), Ltd., are resident charter companies, the latter having three Dakotas and three Rapides. They hope soon to have their own workshop at Jersey suitable for servicing Rapides, and later to have a hangar for Dakota maintenance.

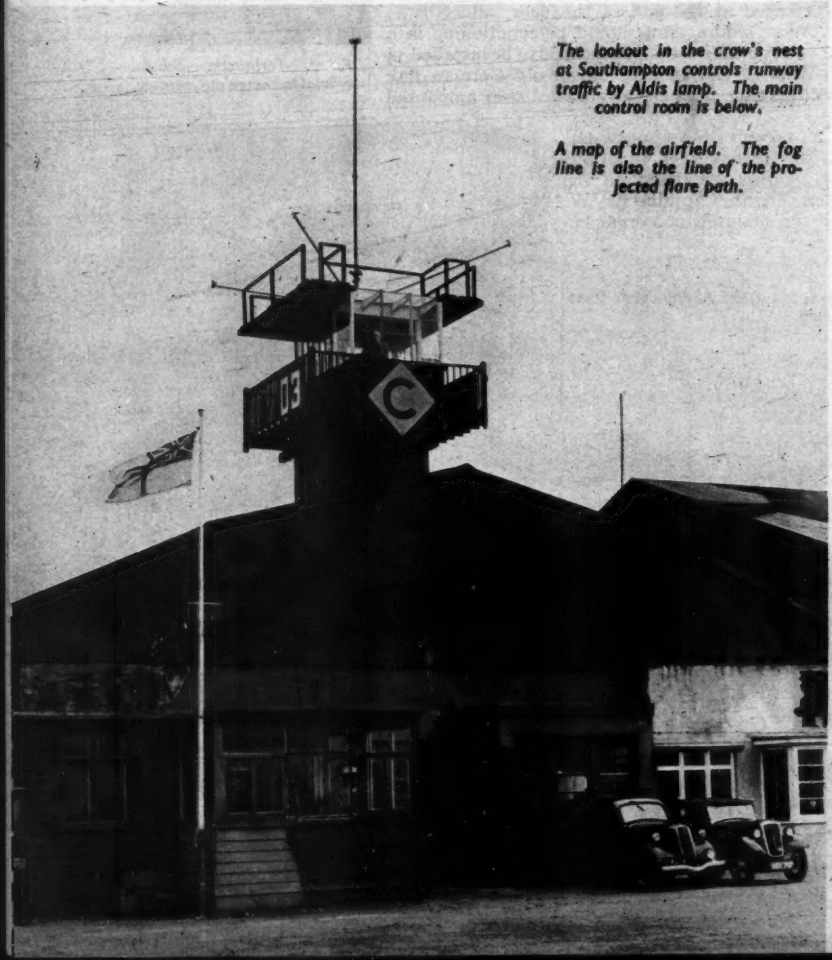
Guernsey Airport

Guernsey is an island of greenhouses. and from the air the acres of glass appear to spread in utter confusion. As we approached the airfield the white fog line stretched out across the grass. It is a very helpful visual aid in the low cloud formations of summer. Traffic is not as heavy here as at Jersey, but even so 45,374 passengers have been handled this year up to October 15th. To analyse movements, B.E.A. have flown into Guernsey 10,441 passengers on inter-Island service and 5,820 from the mainland. Passengers outgoing to other Islands numbered 10,169 and to the mainland 7,695. Charter companies flew a total of 10,344 passengers on inter-Island services and to and from the mainland. Together with local flights, movements totalled 14,398. Peak-day total was 176, and 100 a day was averaged in August.

The airfield is owned and operated by the States of Guernsey. In this case the Airport sub-committee of the Board of Administration is the responsible body for all civil aviation in the Island. The M.C.A. acts only in an advisory capacity. Guernsey is a small grass airport 345 ft above sea-level, three miles from St. Peter Port. The approaches are good and the airport is, in fact, situated on the highest point of the Island. The State is anxious to develop the airport and has accepted the advice of well-known airport architects; plans for extensions have been produced.

One MF channel operates for communication and DF purposes, and airfield control uses HF/RT. Contact lighting is already installed, and VHF is projected. Air Transport Charter (C.I.), Ltd., have a branch at the airport; the Air Transport Association, Universal Flying Services and Channel Air Ferries also have offices. The maximum weight permissible for landing is 16,500 lb, but with previous permission aircraft exceeding that weight, but not exceeding 20,000 lb, may be accepted. The incidence of rain during the winter is normally high, and during last winter—which was, of course, especially wet—the airport was shut down for 72 days, owing to the condition of the surface.

Incidentally, his many old acquaintances will be glad to know that Henri Biard, the



The lookout in the crow's nest at Southampton controls runway traffic by Aldis lamp. The main control room is below.

A map of the airfield. The fog line is also the line of the projected flare path.

Internal Air Lines . . . . :

one-time Schneider Trophy and Supermarine test pilot, is running the meteorological section here.

The B.E.A. winter schedules omit direct services between London and Guernsey. Although this at first appears to be a disadvantage, the aircraft are based at Jersey and, weather and airfield permitting, call at Guernsey under that arrangement. Passengers may be taken by water to Jersey for the flight to the mainland if Guernsey is unfit.

Southampton

In addition to its function as an airport, Eastleigh is the home of one of the Vickers maintenance bases, Cunliffe-Owen's factory, Saunders Roe, Universal Flying Services, Rollasons, and the Hampshire Aeroplane Club. In 1916 the American Navy opened Eastleigh as an air station, and the hangars are still in use. After the war the air station remained unused until the early 1920s, when the trans-atlantic shipping companies bought and opened it as Atlantic Park to be used as a clearing station for emigrants to Canada and the U.S. The Southampton Corporation bought the site in 1930, and opened it as an airport in 1934. Jersey Airways operated the first scheduled service to Southampton at the end of that year. Night-flying equipment was installed in 1935, and it has since been developed for all types of flying. The Admiralty requisitioned Eastleigh as H.M.S. *Raven* and used the airfield throughout the war. In 1946 it was released, and now the M.C.A. are negotiating for ownership and control.

From that short account of the development at Southampton may be judged the resultant chaotic condition of accommodation. Each new owner has erected new and made additions to existing buildings.

The Corporation are operating in totally inadequate space, and the impression given to passengers of the tarmac conditions and passenger-handling facilities is poor.

To suggest airily that new buildings are necessary is not intended, but it does appear that whereas large building programmes are going ahead at the London and some other airports, others of no less importance, are being neglected. Southampton is in a happy geographical position and traffic will undoubtedly expand, provided facilities progress to meet the demand.

The ownership situation is still *sub judice*, and consequently little can be done at present; but the M.C.A. will be responsible for providing the means for dealing with next year's tourist traffic.

During the six months from April to September 30th this year, in 5,009 aircraft movements 18,770 passengers travelled in and out, of which incidentally 1,446 were en route to Weston. In addition to passengers, the freight traffic is heavy. To the Channel Islands 303,079 lb of freight and 143,106 lb of G.P.O. mail was carried, and 75,014 lb of freight was flown in from the Islands. Flowers were flown in weighing 58,000 lb, and thousands of day-old chicks have passed through. During the summer there were 17 services a day each way. There are now 15 in and out, including a Dakota service which started on November 1st. Charter movements over the four peak months were: June, 1,195; July, 888; August, 1,291; September, 961.

With such a traffic volume not only is there inadequate accommodation but the airfield will require eventual extension. About 400 yards can be added to the North-West run, which might also allow the construction of another runway, at the Northern end, in the East/West direction. A type G electric flare path is going in, with sunken concrete lights and a sodium approach funnel on the 030 QDM landing run. MF/DF and VHF/RT are installed, VHF/DF is expected, and the airport is listed to have S.B.A. in place of Loran 2 which is now being removed.

The Channel Islands routes are probably the most profitable in the whole B.E.A. system. The carrying capacity of the aircraft is small, however, and a type is needed to carry an economic load at a moderate cruising speed and low landing speed. On such routes, where the advantage of air over sea is established, high speed is unnecessary.

ROTATING-WING KITE OR GLIDER

A FEW weeks ago a friend of ours, Mr. Bruce Williams, the well-known parachutist, called to discuss an idea which he had been nursing for some time. After an interesting and amusing chat he agreed to let us have some suggestions on paper. They duly arrived, and although it was probably not the author's intention, it was felt that they merited publication as they stood. They are presented below without further introduction.

LONG ago, when a "drone" was a powered glider and spivs were professional parachutists—too lazy to work and too foolish to know what they were doing—I saw the need for a rotating-wing glider to replace in part the parachute. Not so much for the individual, but for dropping medical aid and doctors or fire equipment into inaccessible spots with a reasonable degree of accuracy. I think it was in the middle 'thirties when some R.A.F. boxers crashed in the jungle, and though they were discovered from the air, it took some days for the ground party to fight their way to them.

I knew the difficulties of getting spot landings by parachute, as I had toured the country with the Air Displays, often finishing up in hedges and trees, and sometimes in hospitals.

Came the war, and I found myself in the next bed to M.A.P.'s Parachute Officer, S/L. Ross Shore, D.F.C., who was recovering from landing on a roof and then walking off. I had left Dunkirk in a hurry but couldn't make the swim, and after swopping lines I found myself posted from my squadron to Ringway as the first Chief Parachute Instructor. However, too many people are writing the "How I Won the War" series with this background, so I will get back to my rotating-wing story.

Very early on I had put up to M.I.5 some possibilities of a rotating-wing glider. I had thought up a few super-spy schemes to which they had very decently listened without any outward show that they thought me a little round the bend. So when I realized that we were very short of silk for parachutes, I put my story to my C.O., S/L. L. A. Strange, D.S.O., D.F.C., and he, together with the late W/C. Sir Nigel Norman, believed me.

Sir Nigel soon got things moving and managed to persuade M.A.P. to place the two leading rotating-wing experts, Raoul Hafner and Dr. J. A. J. Bennett together at Ringway airfield.

Then started some of the most amusing experiments. Everybody was firmly convinced that madness reigned in the Development Unit, as it was called, and pictures appeared of grown men running around with toy windmills. But after many months of slide-rule labour, the Rotor Chute, as it was to be called, appeared and proved quite tractable in the hands of F/L. Little, M.B.E. I must confess now that I had nothing to do with its actual production, though I always claim it as a child of mine, and I certainly followed its career like a "mother." We later found out that the Germans too had thought of it.

This brings me to the main point of my story. If a light, one-man rotating-wing kite can be successful, why not build a larger version and use it for one of the numerous ways that spring to mind? It could be used as a cheap and easy means for giving familiarization of controls, towed just airborne on a truck. This should appeal to the A.T.C., who have so much hard work merely for a ground slide in a primary glider. Or it could be towed behind a launch at sea, or behind a jeep on the beach, for increasing the fun of that trip in the "Skylark" or speedboat. And, of course, it could form a test bed for rotating-wing experiments.

I am usually asked: What are its advantages over a glider? Well, it is just as safe or safer; it does not drop like a helicopter with engine failure before picking up autorotation, as that is its normal form of lift; it lands slowly in the shortest space; it has a short take-off, especially if rotation is started previously.

I have thought of a dozen ways of using the kite, and I have convinced quite a few people of its possibilities. But, alas, I am a complete sprog in the whole matter. Perhaps some of *Flight's* more serious-minded readers could relax for long enough to pin down the snags. I am anxious to start something on these lines and would be delighted to have an opinion before I spend my ill-gotten gains, and would be glad of any co-operation large or small. As it seems to be some time before our manufacturers will have large-scale results from their helicopter plans, I can see a couple of years' remunerative amusement before we return to sanity.

BRUCE WILLIAMS.

ENGINE-OFF LANDINGS

Part 2 of Lecture "Some Work with Rotating-wing Aircraft" : The Case of Rotors with High Kinetic Energy

LAST week we published the first part of that section of Mr. Fitzwilliams's lecture to the Helicopter Association which dealt with the engine-off landings which can be practised with the helicopters now in common use. It considered the speed of the approach glide to be varied from 75 m.p.h. I.A.S. down to 40 m.p.h. I.A.S., and in all the landings the use of the collective pitch control was of secondary importance, being voluntary when the approach glide was fast, and assisted by flaring of the rotor when the approach glide was slow. Mr. Fitzwilliams next turned to a discussion of the landings which will be typical of the future.

Landing from fast glides will become increasingly easy with continued improvement in top speeds and gliding angles, but these improvements are likely to be significant while the helicopter is looking for a landing place rather than in the actual landing, because the best gliding performance will always be associated with comparatively low rotor speed. The distinguishing feature of the approach glide of future helicopters will be that the rotor speed will be high by present standards, while the corresponding glide performance remains much the same as it is now. When a landing place is decided on, the action of increasing the rotor speed in preparation for the landing will be in some respects analogous to putting down the flaps of a fixed-wing aircraft. Once this action has been taken, the easiest landing is done from a glide at about 30-40 m.p.h., and in future the fast approach glide will be seen only as part of a training exercise designed to separate the motions of a landing for the purpose of initial instruction.

Near-Vertical Landings

Our present helicopters are already capable of reasonably easy engine-off landings from approach glides as slow as 40 m.p.h., and the problem of future engine-off landings is concerned with the ability of a helicopter to land from steep glides at the minimum steady airspeed. Here the collective pitch control is the only means of effecting a gentle landing, and the typical motion of the helicopter during the landing may be described as a pull-up. Also the typical application of the pull-up is for arresting the downward motion of a helicopter which is descending vertically in still air at its terminal velocity.

In these conditions the sinking speed of a C.30 Autogiro would be about 35 ft/sec.; of a Hoverfly I, about 40 ft/sec.; and of a contemporary design with high rotor speed, about 45 ft/sec. or about 30 m.p.h. vertically downwards. Not so long ago it was quite commonly thought impossible to design a practical helicopter which would be capable of using the kinetic energy of its rotors to arrest this motion so that a gentle engine-off landing could be made in pure vertical flight.

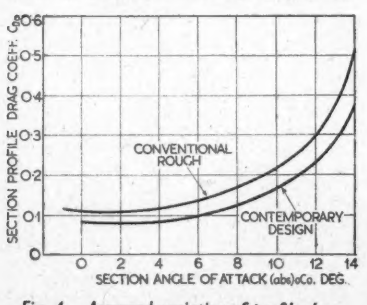


Fig. 4. Assumed variation of profile drag coefficient for typical helicopter blade aerofoil sections.

I thought it might be as well to find some logical basis for supposing that vertical engine-off landings are not only desirable but also possible and ever probable. At first this seemed rather a formidable undertaking, and I got some quite severe headaches from trying to turn inside-out Dr. Bennett's well-known calculations on the jump take-off of Autogiros. O'Hara, of Beaulieu, has succeeded in doing this, but fortunately I found that the performance of a helicopter in a pull-up can also be examined in a very simple manner, provided attention is confined to particular cases rather than general solutions, and it was quite easy to show that a gentle engine-off landing in pure vertical flight is possible with a helicopter having characteristics which are within the normal range of current design practice.

So far as I know these first estimates are still the only published information on this subject. They are based on two very conservative assumptions, but all estimates of this kind are to some extent guesswork, and it is convenient to examine the more pessimistic guesses first. On the other hand, although I think there is no doubt about the possibility of such landings, the ease with which they can be performed remains a matter of opinion. For this reason I will briefly outline the way in which the estimates were made.

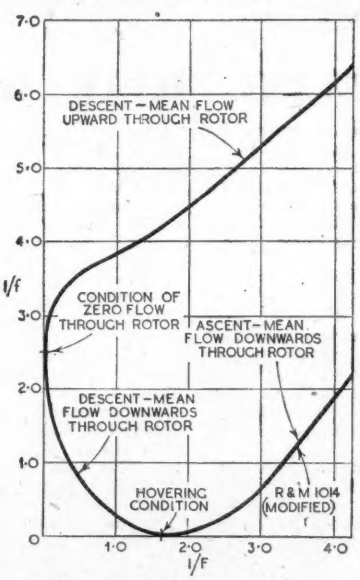


Fig. 5. Assumed relation between coefficients I/f and I/F for full-scale rotors.

If, for a given helicopter, we know the inertia and profile drag characteristics of the rotor system, and the initial rotor speed and rate of descent, we can find out the rate at which the kinetic energy of the rotor system is being expended at any instant during a pull-up, provided we know the manner in which the rate of descent and the flow through the rotor have varied up till that instant.

The reason why the flow through the rotor is important is easily seen if we consider a helicopter being lowered steadily through the air with its rotor blades outstretched but not revolving. In this case the air will pass freely up through the rotor, because there is nothing to stop it. But if the blades are allowed to rotate so that in steady flight they produce a thrust equal to the weight, it is clear that they can only produce this thrust by throwing air downward or, in other words, by beating down the air which is trying to leak up through the rotor.

While the helicopter is descending it is

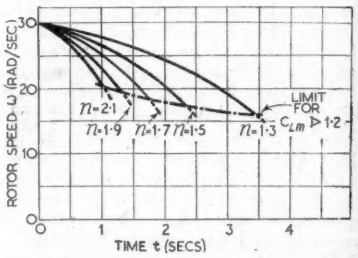


Fig. 6. Helicopter A. Rotor speed during pull-up. First estimate.

continuously losing the potential energy, or capacity for doing work, which it possesses by virtue of its height above the ground, and this energy is being lost because it is being expended by the rotor in throwing air downwards (relative to the ground).

Now, if there were no other losses in the system, the potential energy supplied would be equal to the energy required by the rotor to induce the required downward flow of air. Also the downward velocity of this induced flow would be exactly equal to the rate of descent, that is exactly equal to the speed at which air is trying to leak upwards through the rotor. In consequence, there would be no flow at all through an ideal rotor which is rotating freely in steady vertical descent.

Thus any flow through a descending rotor is a measure of the energy which is being absorbed or given out by the rotor itself, as distinct from the potential energy which is being lost by the aircraft as a whole. For instance, a certain amount of energy is absorbed by a real rotor in overcoming the profile drag of the rotating blades, and therefore in steady vertical descent potential energy must be supplied at a greater rate than is needed to produce the required induced flow. Thus the steady rate of descent of a real helicopter is greater than the downward velocity of the induced flow, so that air leaks upward through the rotor at a small velocity.

Calculating Engine-Off Hovering

Again, in the particular case of hovering flight without engine power, we know, for instance, that the whole of the downwash through the rotor is created by energy extracted from the rotor. Also for any rotor speed we can calculate the rate at which additional energy is being extracted to overcome the profile drag of the blades. (The information required to do this is obtained from standard curves such as those shown in Fig. 4, which refer to the blades of the Hoverfly I and of a helicopter of contemporary design.)

Therefore, if we know the inertia charac-

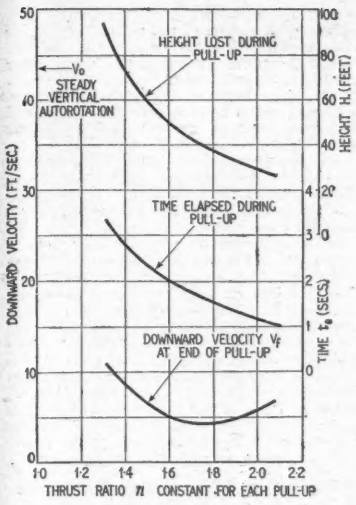


Fig. 7. Helicopter A. Performance in vertical pull-ups without engine power.

teristics of the rotor system, we can find the rate at which it is decelerating at any rotor speed. But we have already seen, in the case of an ordinary float, that when deceleration is known as a function of speed, a very simple calculation will tell us how long it takes for the speed to fall from its initial value to the minimum permissible. Thus we can easily calculate how long a helicopter can remain in hovering flight, or any other steady condition, after the engine has failed.

The Pull-Up Condition

In a very similar way we can estimate the extent to which the rate of descent of a helicopter can be reduced in a pull-up without engine power. The calculation is still very simple, but in a pull-up the rotor thrust, the rate of descent, and the flow through the rotor are all varying, so that, before an estimate can be made, it is necessary to state the kind of landing which is to be considered. For academic reasons it might be convenient to consider a landing in which the coning angle is constant, or one in which the rotor thrust varies in a particular manner with rate of descent. But, in a real pull-up, the rotor thrust ought to be under the control of the pilot, and I think a practical case is fairly well represented by the motion of a helicopter doing a pull-up at constant thrust, which corresponds to applying a constant pressure to the brake pedal of a car. To get a comprehensive picture it is then only necessary to compare the performance of the helicopter in a number of pull-ups at different amounts of constant thrust.

The assumption of constant rotor thrust means that the pull-up is done at constant deceleration, and the rate of descent is then known at any instant. Also, if the thrust and rate of descent are known at any instant, we can find the corresponding flow through the rotor from Fig. 5, which, so far as we are concerned, shows the relation between the rate of descent of a helicopter (plotted here as $\frac{I}{f}$) and the flow through the rotor (plotted here as $\frac{I}{F}$) when the thrust is constant. This curve is in three parts, which are labelled to show to what condition of flight they refer. It is not a calculated curve because there is no reliable means of calculating it. Instead, it is an estimate based on model tests and on a few tests of full-scale rotors. The precise shape of the curve remains to be determined and is probably also a function of disc loading. Perhaps the best thing I can say about this particular curve is that, apart from fitting a few test results, it is cribbed from the best possible authorities, so I don't think it will be suggested that the probable inaccuracies in its shape would seriously affect conclusions with regard to pull-ups.

In steady vertical descent we can calculate the upward flow through the rotor which provides the energy required to overcome the profile drag of the blades, so that we know $\frac{I}{F}$, which is small, and we find that the operating state of the rotor is then defined by a point near the lower end of the top branch of the curve. From the vertical scale we have the corresponding value of $\frac{I}{f}$ from which the rate of descent can be calculated. Similarly, if we know the rate of descent we can use the curve to find the corresponding flow through the rotor.

In a pull-up at constant thrust we know the thrust and the rate of descent at any instant, and if we assume that the curve applies to unsteady as well as to steady motions, we can find the corresponding flow through the rotor. If the pull-up is performed at all rapidly, this assumption is grossly conservative, as we shall see later, but even so the resulting estimates are quite encouraging.

When all the necessary information is collected together, it can be fed into a very simple equation which shows the manner in which rotor speed falls off with time after the commencement of a pull-up. The results

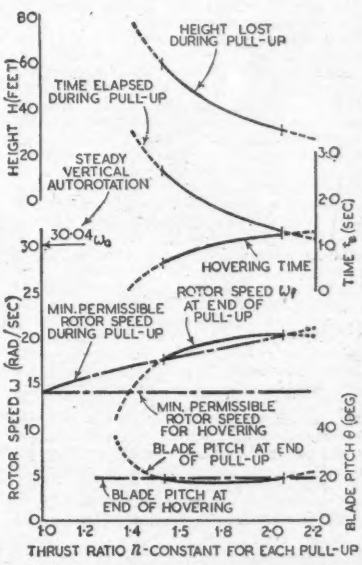

HEIGHT LOST DURING PULL-UP
TIME ELAPSED DURING PULL-UP
STEADY VERTICAL AUTOROTATION
$30 \cdot 04\,\omega_0$
HOVERING TIME
ROTOR SPEED ω_F AT END OF PULL-UP
MIN. PERMISSIBLE ROTOR SPEED DURING PULL-UP
MIN. PERMISSIBLE ROTOR SPEED FOR HOVERING
BLADE PITCH AT END OF PULL-UP
BLADE PITCH AT END OF HOVERING
HEIGHT H (FEET)
TIME t_0 (SEC)
ROTOR SPEED ω (RAD/SEC)
BLADE PITCH θ (DEG)
THRUST RATIO n CONSTANT FOR EACH PULL-UP

Fig. 8. Helicopter C. Performance in vertical landing without engine power.

are shown in Fig. 6 for a typical contemporary design in five pull-ups at different amounts of constant thrust. The thrust is expressed here as the ratio n so that the right-hand curve refers to a pull-up in which the rotor thrust is 1.3 times the weight, and the left-hand curve refers to a pull-up when the thrust is 2.1 times the weight. The horizontal scale is seconds, but the vertical scale is in radians per second, so that the rotor speed in r.p.m. would be slightly less than ten times the figures shown. The initial tip speed of this rotor is about 705 ft/sec, or 0.64 times the speed of sound.

As the rotor speed falls off while the thrust remains constant, the blades would ultimately either stall or cone-up until they reached their upper stops. In this design they would stall first, and each curve is continued to a point where the mean lift coefficient of the rotor blades has risen to 1.2, which is taken to indicate stalling and therefore the end of the pull-up. The time spent in the pull-up is, therefore, known in each case, so that the rate of descent at the end of the pull-up is easily calculated. The way in which the rate of descent at the end of the pull-up varies with the thrust during the pull-up is shown in the lower curve of Fig. 7.

The other curves in this diagram show the way in which the height lost in the pull-up, and the time spent in it, vary with the rotor thrust. According to this graph, the pull-up can be commenced at any height between 100ft and 20ft without the final velocity exceeding 12 ft/sec, which is the capacity of a normal undercarriage, while the final velocity would be less than 6 ft/sec if the pull-up is commenced between 60ft and 30ft from the ground.

I think you will agree that as an example of pessimism this is not a bad effort. Nevertheless, the curves do not indicate that the helicopter would stop, and, as I was reluctant to abandon the conservative basis of these estimates, it was necessary to find some means of representing the degree of improvement which could be expected without major alterations in the design. If such an improvement were needed in an actual case, it would be obtained by small decreases in disc loading and solidity, and by small increases in rotor speed and blade weight, but to preserve a direct comparison in the estimates I lumped these all together and represented them by a single increase of 30 per cent in the weight of the main rotor blades, which amounts to a 2 per cent increase in the total weight of the aircraft. As this particular design can hover in still air at much more than its normal weight, I don't think even this unnecessarily large increase of 2 per cent would noticeably affect the normal performance. The effect on the performance in a vertical pull-up is, however, quite impressive, as shown in Fig. 8.

Avoiding Blade Stall in Pull-Up

The thick curve in the middle of Fig. 8 shows the way in which the rotor speed at the end of the pull-up varies with different values of the thrust. The slanting chain-dotted line just below the thick curve indicates the way in which the minimum rotor speed, at which blade stalling occurs, increases when thrust is increased. Comparing this slanting line with the thick curve, we find that the rotor speed at the end of the pull-up exceeds the minimum permissible over quite a large range of variations in thrust. Within this range the helicopter will be brought to rest in a pull-up without stalling of the blades, and the rotor speed at the end of the pull-up is then still a good deal higher than the minimum which is permissible in hovering flight, so that a brief period of hovering flight will be possible before the helicopter settles on to the ground. The time elapsed during the pull-up, and the time available for hovering, are indicated by the curve immediately above the thick curve.

Here again the performance is underestimated because the hovering time refers to hovering in free air and makes no allowance for the ground cushion. Also a closer inspection of the thick curve shows quite clearly that the assumption of constant thrust does not represent the most

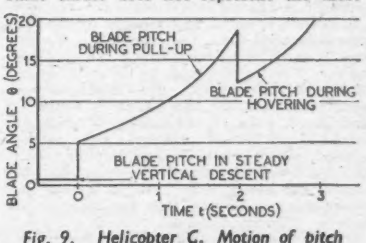

BLADE PITCH DURING PULL-UP
BLADE PITCH DURING HOVERING
BLADE PITCH IN STEADY VERTICAL DESCENT
BLADE ANGLE θ (DEGREES)
TIME t (SECONDS)

Fig. 9. Helicopter C. Motion of pitch control in a vertical landing when $n = 1.7$ in pull-up.

Engine-off Landings . . . . .

effective pull-up, because if we consider the right-hand end of the thick curve, where it crosses the slanting line, it is obvious that although the pull-up cannot be continued at the same high thrust, it could quite well be continued at a lower thrust, in which case the helicopter would have started to go up again before blade stalling occurred.

In a typical landing in which the pull-up is done at constant thrust, the motion of the pitch lever would be as shown in Fig. 9, where the sharp increase in pitch at the beginning of the pull-up corresponds to the sudden increase of thrust to the value which is afterwards held constant. (The figures in this diagram are calculated in a rather crude way, and are intended to indicate motion of the pitch lever rather than absolute values of blade pitch, which is shown too small by about a degree.)

The sudden decrease of pitch at the end of the pull-up would then be necessary to prevent the helicopter from rising again. On the other hand, we have already noted that the thrust in a pull-up ought to be high at the beginning and low at the end, so that in the most effective pull-up the initial sharp increase in pitch would be even more marked than in Fig. 9, while there ought to be a less marked reduction in pitch at the end of the pull-up. In fact, this diagram suggests that the most efficient pull-up is one in which the pitch is suddenly increased by about 10 degrees and then left alone until it is wanted for final adjustments as the helicopter settles on to the ground. This action of the pitch lever could, of course, be obtained automatically by pressing a button, but I do not think automatic devices of that kind should be encouraged.

Ground Effect and Air Inertia

Now if the pull-up had been performed in the most effective manner, the original helicopter could have stopped quite easily without the blade weight being increased at all, and at this point I was prepared to let the matter rest for the time being, because it was already clear that engine-off landings in pure vertical flight are possible within the range of our current design practice. But, as I mentioned, not only had the ground effect been neglected in hovering, but also the inertia of the air had been neglected during the pull-up, and this latter feature of the estimates has since been the subject of quite severe criticism on the grounds that they are too pessimistic.

Now the assumption of constant rotor thrust during the pull-up implies that at the beginning of the pull-up the thrust is instantaneously increased to n times the weight of the aircraft, and the reason why these estimates are pessimistic is that to use the curve of Fig. 5 in the way it was used is equivalent to saying that the velocity of the downward-induced flow is also increased instantaneously to n times its normal value. But the induced flow is not something which happens only in the plane of the rotor—on the contrary, to speed it up entails altering the whole flow pattern around the rotor, and the inertia of the air involved in this flow pattern is considerable, so that an appreciable time is required to establish a change in the induced velocity.

I do not know of any reliable method of estimating this time, but certainly in a pull-up the induced velocity would not increase to the value appropriate to the vortex-ring state through which the helicopter is assumed to pass in the estimates we have considered. Also, if the pull-up is quick, it would in practice be performed close to the ground, which would further interfere with the build-up of induced velocity, and in these circumstances I think it is not unreasonable to suppose that the increase in induced velocity is small.

If this is so, the effect on the performance of the pull-up is very considerable, as shown in Fig. 10, which illustrates the performance of the original helicopter with light blades, assuming the induced velocity remains throughout the pull-up at the value appropriate to steady vertical descent. Now this diagram and the previous estimate for this helicopter represent two extreme possibilities, and the truth lies somewhere between them. For instance, an unaltered induced velocity cannot reasonably be accepted in the case of the right-hand curve, which represents a pull-up started at 100ft and lasting over 4½ seconds. In this case the previous estimate of a final velocity of 12 ft/sec is probably somewhat nearer the truth. On the other hand, it is very unlikely that anyone would start a pull-up at 100ft, and, when we consider the more usual height of 40-50ft, it is clear that the pull-up would be over in approximately two seconds and would take place largely within the ground cushion. In these circumstances there will probably not be any large build-up of the induced flow, and I believe the figures quoted in this diagram are close to the truth for typical pull-ups at constant thrust in actual future landings.

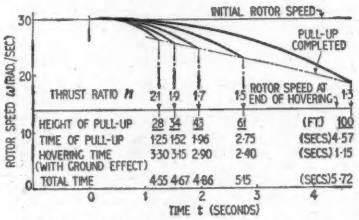


Fig. 10. Helicopter A. Induced velocity unaltered by pull-up.

But we have already noticed that the rotor thrust should be high at the beginning of a pull-up and low at the end for maximum effectiveness, and this is very clearly indicated in the figure, which shows that, in the first half-second of a pull-up, the pilot has at his command a brake of almost unlimited power, within the range which he is likely to require, and which costs practically nothing in rotor energy. The slight flaring of the rotor when the pitch is increased is a phenomenon which must occur whenever the thrust of an autorotating rotor is suddeny increased without a correspondingly sudden increase in the induced flow. The phenomenon is very short-lived in vertical flight, because it can only occur while air is flowing upwards through the rotor, whereas the extra thrust very quickly reduces the rate of descent to less than the velocity of the induced flow, after which the flow through the rotor is downward. In practice, the phenomenon would not produce any significant increase in rotor speed, but it would be noticeable as a small time-lag between the extra thrust and the falling off of rotor speed.

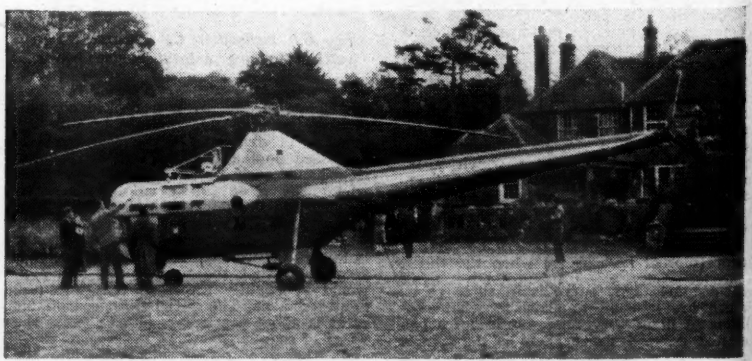
When allowance is made for the inertia of the induced flow, the corresponding estimate of the motion of the pitch lever during the landing will also be altered, and the initial sharp increase in pitch shown in a previous diagram would correspond to a much larger increase in thrust, so that the collective pitch control may be expected to be more sensitive and more powerful than was originally estimated.

The speeds and decelerations shown in this diagram for a typical pull-up from, say, 50ft, are practically the same as in the extra float at the end of an ordinary engine-off landing, namely, an initial speed of 30 m.p.h. and a mean deceleration of slightly more than a half of 1G. Considering the extra braking power which is available, if required, and the allowance of, say, two seconds of hovering time for correction of mistakes, it does not appear that a landing of this kind would be very difficult, unless it can be shown that judgment of height and speed in vertical flight is fundamentally different from that in horizontal motion. Personally, I don't think there will be any difficulty of this kind, and I believe that if a pilot approaches the vertical landing gradually in the course of his training he will find it fairly easy.

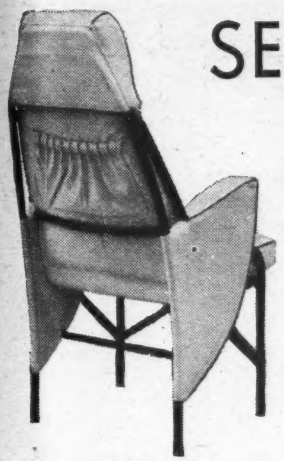
Glides at Minimum Airspeed

The vertical landing is certain to be an important feature of a pilot's training, because it is typical of all landings from glides at the minimum airspeed. In the event of engine failure over built-up areas, or overwooded or uneven ground, a glide at the minimum airspeed is attractive because it allows the pilot to steepen his glide path immediately he sees a clear space for landing, without waiting for the completion of the pull-up which would intervene at higher speeds. Also, when descending steeply, he has complete freedom to use the azimuth stick in changing his flight direction without incurring changes in the flight path speed which would upset his judgment. Where the helicopter must be accurately positioned for a pull-up in a confined space, this freedom and directness in the approach will be valuable features of a helicopter which is capable of vertical engine-off landing.

The normal engine-off landing of such a helicopter would naturally be done in the easiest circumstances, and these will correspond to a glide speed of 30 to 40 m.p.h. where the landing will include a little pull-out, a little flare-out, and plenty of pull-up, all combined in a manœuvre which will be so easy, and will take such a long time anyway, that the power of the engine could not very well be used, even if it were still available. When we have got to this stage, we shall be able to return to the practice of the pre-war flying clubs, where we were taught that every landing should be done as though it were a forced landing in normally easy circumstances. I think this is a very wise teaching, and I hope that in the course of the next few years the use of engine power will largely disappear from the normal landing of a helicopter.



NOT AN ENGINE-OFF LANDING: Alan Bristow recently visited the Lympne Country Club and decided to land the Westland Sikorsky S51 on the 27 yd x 30 d lawn rather than on the nearby airfield.



Scaling only 13 lb this chair represents the limit in comfort per lb weight.

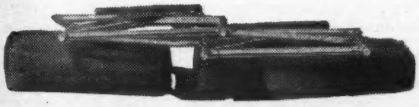
SEATS for the MIGHTY and the MILLION

Problems in Aircraft Seating: Complete Conversion Kits for Dakotas and Skymasters

Super comfort in flight costs only 38 lb in weight.

As the design of aircraft progresses, the fitting-out of interiors becomes more and more the task of specialists. Important as is the aesthetic aspect, the main problems are seating and silence. Luxurious and super-comfortable armchairs have been made since time immemorial, but just five minutes inside a factory like Rumbold's is sufficient to prove anyone wrong who thinks that aircraft seats are just armchairs with a bit of lightness added.

Almost every aircraft presents some difference, which means that nearly every chair is a "one-off," and it is next to impossible to get into real mass production. In addition, a number of exacting requirements have to be met. Lightness is an essential; this is met by using magnesium tubing almost exclusively for the framework of all models. Comfort is an elusive and difficult quality to inhere.



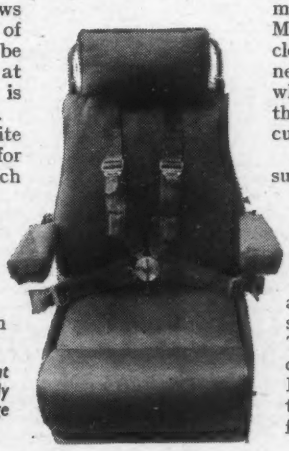
The LAR/140 aircraft chair shown erected and folded. Cushions are of generous dimensions.

The passenger who pays more than first-class rail fare rightly expects a luxurious standard, yet the operator can easily make a loss by virtue of the over-generous weight of the cabin furnishings.

Actual fabrics themselves are a major problem. When one remembers that any part of the world is now within 60 hours' flying time of any other part, it is obvious that the furnishings and chair coverings must be equally suitable for use in the damp of England, the snows of northern Canada and the tropical heat of Africa. Added to the foregoing there must be real strength—all seats must stand up to at least 6 g—and the appearance, so far as is possible, must be that of massive generosity.

Of course, it is not to be expected that quite the same standard of comfort is demanded for a multi-seater on short-haul work as that which can be achieved in a super V.I.P.s' aircraft. Yet the differences are not so great as would be imagined. Rumbold's lightest aircraft seat weighs but 13 lb, while the latest luxury model scales only 38 lb complete with footrest.

An interesting innovation, of which the firm is very proud, is the new LAR/140 folding chair, which provides an excellent standard of comfort and, while weighing only 27 lb, packs down to a rectangle 52in long, 28in wide and 9¾in deep. The main purpose in the design of this chair is to use it in aircraft on routes where there are big variations in freight loads and the numbers of passengers carried. For each chair four small keyholed plates are permanently fixed to the floor, and the chairs are fitted or dismantled as required. Erection or dismantling is easily accomplished in well under 20 seconds. This type has been much in use in the evacuation flights between India and Pakistan.



The new pilot's seat designed especially for the Handley Page Hastings.

Passengers, however, are not the only people in an aircraft who have to sit down. The crew also have their special requirements. Pilots' seats must be efficient and comfortable; wireless operators' and navigators' chairs must swivel and slide, and in military types the bomb aimer must have suitable support. All these have to be designed and supplied in never-ending variety to suit particular aircraft. At present a special batch is coming through for the Handley Page Hastings.

Chairs, however specialized, are but a part of the furnishing and decoration of an aircraft. For over 20 years the concern has devoted itself almost exclusively to the complete furnishing, decoration and sound-proofing of aircraft, and now they have got so far as even to be designing their own special fabrics. One of these, which goes by the name of Laride, is a utility covering in the best, not the modern, sense of the word. It has a PVC plastic facing on an all-wool backing, and has the feel and appearance of a pliable leather.

Sound-proofing is very skilled work calling for wide experience and, in this connection, there is at the offices a much-prized document which reads "Secret Memo. C.54B Special. Owner's cabin. The clock is to be made more silent." The Owner, needless to say, was Mr. Winston Churchill when he was Prime Minister. Rumbold's felt they were getting somewhere when the customer complained of a noisy clock.

A departure of singular interest to-day is the supply of complete conversion kits for Dakotas and Skymasters. Large numbers of these have already been supplied, notably to K.L.M. and Fokkers. Customers close at hand receive their kits in progressive consignments, but those kits which go farther afield are sent complete in cases with an instructor to help in the work of installation. The schedules of these kits are a revelation of careful thinking, down to tiny detail. Everything is included even to tea spoons in the galley. Over 60 per cent of these kits go for export.

CIVIL AVIATION NEWS

OVER SEATTLE : Flight-testing of the Boeing Stratocruiser is progressing, but news has come through that deliveries may be delayed. Recent DC-6 crashes have prompted a review of design to ensure that all inflammable material is isolated. B.O.A.C. have ordered six Stratocruisers.

B.E.A.C. Interest in new Airline for Cyprus : Air Traffic in India : Criticism of the DC-6

HELICOPTER EXPERIMENTS

B.E.A. Experimental Helicopter Unit is now ready to start serious scheduled dummy-mail flights in the West Country. The Unit has established itself at the Westland Aircraft Company's airfield at Yeovil for ease of general servicing and technical development. B.E.A. have two Sikorsky S-51 and two Irvin-Bell 47-B3 helicopters, and a third S-51 is to be delivered shortly. All have been imported from America, but the Sikorsky models have been assembled by Westlands who have a manufacturing licence, and who will later produce the S-51 as the Westland-Sikorsky, powered by an Alvis Leonides engine. The present American version is powered by a 450 h.p. Pratt and Whitney Wasp Junior. Mr. N. E. Rowe, head of the Corporation's Research and Long Term Development Branch—of which the Helicopter Unit is a part—has arranged for the experiments to progress in logical stages.

W/C. R. A. C. Brie is in charge of the unit, and his four pilots have been flying from Yeovil around a circuit covering 120 miles and passing over Sherborne, Gillingham, Blandford, Wimborne Minster, Poole, Wareham, Dorchester, Lyme Regis and back to Yeovil, making themselves familiar with the characteristics of the route. The next stage, which is about to begin, will entail regular scheduled flights over the same route but stopping in selected fields nearest to the post office at the previously mentioned places. The shortest stage is four miles and the longest, from Lyme Regis to Yeovil, is 17 miles. Dummy mail will be carried, and from the results the Corporation will assess the value of the helicopter as a means of transport in all weather conditions and at night, and also estimate its value from an economic standpoint. The G.P.O. will also make similar observations.

Having become completely familiarized with the type of operation and the countryside throughout the winter, the unit will move to Eastern England and be based in the Norwich or Peterborough area. It will carry out similar operations but delivering actual mails, in the rural districts where local rail connections to the main line are poor. It has already been estimated that a saving of more than 12 hours can be made in the delivery of mail in East Anglia. Mr. Rowe is of the opinion that in order to develop regular scheduled flights in all weather conditions and at night with helicopters, it will be necessary to introduce new types of instruments and other equipment.

CYPRUS AIRWAYS

DETAILS of the air transport company formed in Cyprus have been announced. The company is to be known as Cyprus Airways Limited, and will have an authorized capital of £250,000, of which only half has so far been called up, subscribed up to some 45 per cent by B.E.A., some 20 per cent by the Cyprus Government, and the balance by a large number of Cypriot residents.

The company held its first board meeting on October 2nd and delivery of the first aircraft is expected in the near future. Three 21-seater Dakotas are at present being converted by Scottish Aviation at Prestwick, and special movable bulkheads are being fitted in order that they may be used for passenger or cargo carrying. Although local personnel will be engaged for operating the company, the flying and technical staff will be supplied by B.E.A., whose operating standards will be maintained. Directors of the company have been named and those representing the Cyprus Government are Mr. R. E. Turnbull, C.M.G., Colonial Secretary, and Mr. P. P. Taylor, O.B.E., Director of Public Works; representing B.E.A. are Mr. G. d'Erlanger, C.B.E., the Earl of Amherst, M.C., Cdr. V. Wolfson, O.B.E., and Mr. J. A. Vick; representing Cypriots are M. D. N. Dimitriou, O.B.E., M. G. Schiza, M. P. M. Tseriotis and M. I. Araouso.

Owing to the lack of communications Cyprus has not been developed for tourists, and the introduction of Cyprus Airways will bring the island for the first time within easy reach of important centres. The air services which have so far been planned will cover the following routes: between Cyprus, Alexandria and Cairo; Cyprus, Palestine and Syria; Cyprus, Rhodes, Smyrna and Istanbul, and between Cyprus and Athens. The service from Cyprus to Athens will provide connection with the main British European Airways route from the United Kingdom to Rome, Athens, Istanbul and Ankara, on which a Viking Service is operated four times a week to Athens. The new company's airport headquarters will be at Nicosia, approximately 14 flying hours from Northolt.

OVERLOADING ON THE "SKY QUEEN"?

AT the enquiry into the forced Atlantic landing of the *Sky Queen* held in New York, Mr. Walter Yaramashyn, the first engineer of the flying-boat, stated that the load was 2½

tons over the maximum permitted, and admitted that on leaving the aircraft he did not take the records with him.

The navigator, in evidence, said that no rescue drills had been held before the landing, that plans were worked out while preparing to land and completed after landing, according to information which arrived this week. The emergency equipment, he said, had been checked at Poole. There had been suggestions by passengers that they did not see crew members until some time after the landing, but in his evidence the navigator said that he and the second officer went through checking safety belts before the aircraft was landed, but the crew were not in uniform and so may not have been recognized.

Mr. Edward Hodgson, an American C.A.B. inspector, told the Court of Enquiry that the *Sky Queen* carried 69 passengers, whereas 25 should have been carried, and that if it had flown under regular commercial airline inspection it would have carried 2,550 gallons of fuel, not 2,396; and considerable less baggage.

NEW INDIAN AIRLINE

AN airline company with capital equivalent to £5,250,000 jointly owed by the State and private investors, has been formed in India. Air-India International, Ltd., as it is called, is to operate a twice-weekly service between Bombay and London, via Cairo, with one Continental stop. More frequent services are planned. As the largest shareholder the Government will have effective control, but the Minister of Communications has announced that "by entrusting the day-to-day management to a sector of private enterprise well established in the field of air transport, important, objective, efficient management based on commercial principles will be achieved." The well-established private enterprise is Air India, the former Tata Air Lines.

LICENCE BATTLE IN AUSTRALIA

ALTHOUGH Guinea Airways' licence to run the Darwin-Adelaide service expired on October 31st, when Trans-Australia Airlines took over, it announced its intention of continuing to run without a licence, on the grounds that the Civil Aviation Board could not under the constitution refuse to renew an inter-state service licence, a point covered by a High Court decision. The licence has been extended "without prejudice" until December 31st, and in the meantime the service is duplicated, to the same schedules, by Guinea Airways and T.A.A.

C.A.B. SUGGESTS SUBSIDY

THE Civil Aeronautics Board, Washington, has made a proposal that the U.S. Government should grant financial aid to aircraft-manufacturing companies for the development of new transport aircraft. Mr. James Landis, Chairman of the Board, has stated that although the Lockheed Constellation, the Douglas DC-6, and the Boeing Stratocruiser were available for immediate requirements, in his opinion it was not too early to start development work on types to take their place. He proposed that the subsidy should be administered by a joint military and civil department, and that the Government should be partially reimbursed from the revenue received by manufacturers on the sales of aircraft to airlines. He also suggested that the Board should be permitted to revoke as well as grant route authorizations to airlines in order to maintain an up-to-date national airways system, and that the Board should be given jurisdiction over the financial structure of airlines. A further proposal was that multiple taxation of American airlines should be eliminated.

CONCORDIA'S TOUR

THE Cunliffe-Owen Concordia, which is making a European demonstration tour, has completed its visits to Belgium, Holland, Sweden, Norway and Denmark, where it was flown by test pilots of many important companies, and is proceeding to Spain, Portugal, French Morocco, Italy, Yugoslavia, Greece and Turkey.

The aircraft unfortunately made a landing at Stockholm with the nosewheel retracted. The trouble was due to the fitting of taper bolts attaching the operating arm to the drag link cross gear in the retracting gear, a point since covered by modification. The aircraft landed on the main wheels and nosed over at the end of its run. New Alvis Leonides engines and airscrews and new parts for the nosewheel were flown out quickly by Airwork, but *Flight* understands that only an airscrew change had to be made; the old engines passed shock tests, the nosewheel was temporarily fixed in the down position and the Concordia flew again within 18 hours. Later, Airworks' Wayfarer returned with the unwanted new engines.

RADIO AIDS BROCHURE

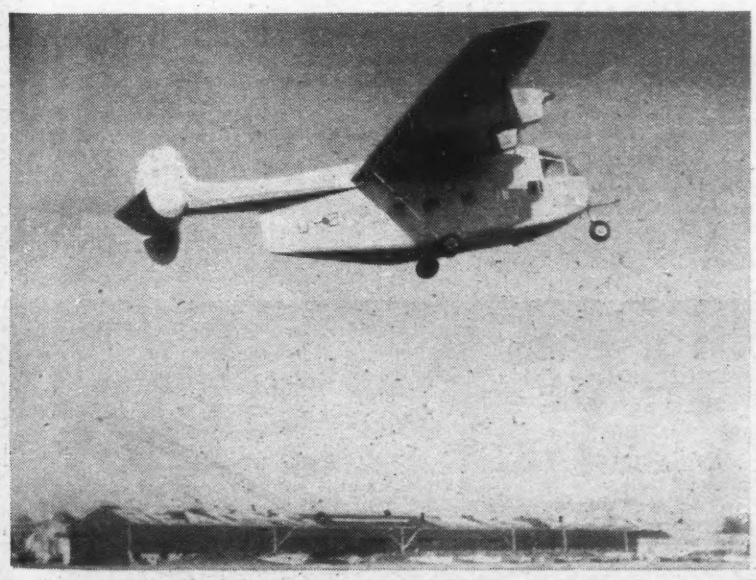
ALL the radio and navigation aid systems demonstrated on behalf of P.I.C.A.O. by the M.o.S. in September, 1946, at the Royal Aircraft Establishment and the Telecommunications Research Establishment are described in a brochure issued by the Ministry of Civil Aviation. Entitled "P.I.C.A.O. Demonstration of Radio Aids to Civil Aviation, September, 1946," the brochure costs 5s from booksellers, or from H.M. Stationery Office.

In addition to the short descriptions in the brochure, a limited number of copies of the original technical papers may be had from the C.E.R.C.A. Central Office, Room 211, Ministry of Civil Aviation, Ariel House, Strand, London, W.C.2, price £4 4s a set, or as individual papers at 1s 6d each. A list is printed in the Ministry's Notice to Airmen No. 323, 1947.

INDIAN AIR TRAFFIC

ON June 30th, this year, India had 111 scheduled air services a week, including an external one to Rangoon, on 23 air routes totalling 15,020 miles. This represents a 42 per cent increase since January, 1947. Goods traffic increased during the same period from 5½ to 7 million ton-miles. Passenger traffic rose from 67,554 passengers carried in the latter half of 1946 to 121,060 in the first half of 1947. Figures for cargo and mail also showed an increase, with cargo at 972 tons and mail at 324 tons, during the half-year, compared with corresponding figures of 458 and 588 tons for the whole of 1946. In spite of considerable increases in capacity, the load factor has not deteriorated, since 76.3 per cent of total capacity was employed; last year the figure was 76 per cent. The regularity of service was 99.1 per cent and this again was an improvement on last year's figure of 96.6 per cent, in spite of the increased scope of operations, and it is unofficially claimed that in the first half of 1947 there were no accidents on scheduled services.

During the period, 126 applications for licences from 22 companies were received by the Licensing Board, of which 13 were withdrawn and 6 rejected, and there were no new companies registered. Agreements with B.O.A.C. and the China National Airways Corporation were terminated but pending new agreements services have been allowed to continue as before, while K.L.M. and Air France are still operating European and Far Eastern ser-

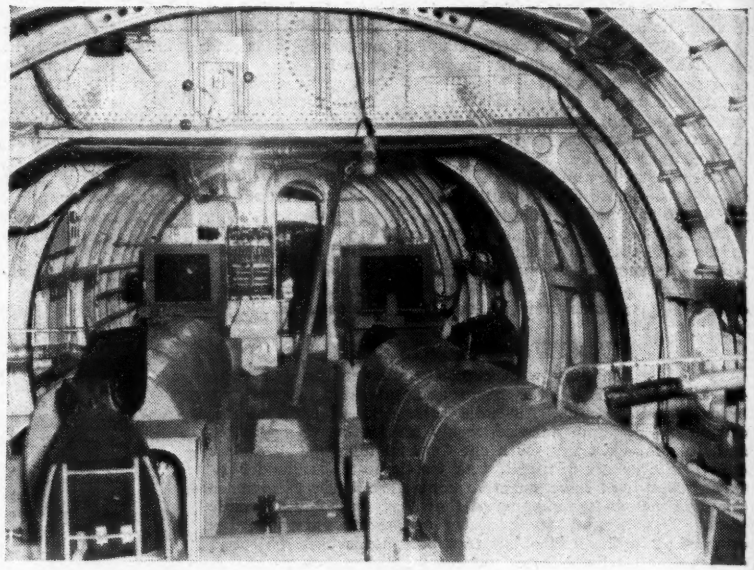


ACTIVITY AT WOODLEY. Flying trials are continuing with the Miles Merchantman, which has four Gypsy Queen 30 engines and has been designed to carry over 2 tons of freight or approximately 20 passengers.

Civil Aviation News . . .

vices for Government purposes. Agreements were reached with Holland and France, and the first American service to India, between Bombay and Washington, was inaugurated by T.W.A. in January, while a second, Karachi-New York, was begun by Pan American Airways in May. Mr. M. I. Rahim, who succeeded Sir Frederick Tymms as head of the Civil Aviation Department in India, visited Kabul in May to examine the idea of a service to Afghanistan, while negotiations with Iran and Iraq were also started.

All airfield traffic control facilities were handed over by the Air Force to civil aviation authorities in June, and there has been much expansion of these facilities, including a new Regional Communication Office at Calcutta. The Radio units have been busy digesting all the equipment taken over from the R.A.F., U.S.A.A.F. and B.O.A.C. (*News of clubs in India appears on page* 589.)



ALL SET FOR TESTS: The prototype Airspeed Ambassador fitted up for tests, showing water ballast tanks holding 345 galls, a M.A.P. pyrometer box (right of starboard ballast tank), and the automatic recorders, which have fluorescent lighting to illuminate the dials for photography. The tests have now exceeded 50 hours.

AIR PACT WITH CZECHS

BY the terms of a British-Czech pact signed on November 10th, B.E.A.'s route from London to Prague will be extended to Vienna and Budapest, and the Czech route to London may, as soon as four-engined aircraft are obtained, be extended to Dublin and New York. The pact, which was signed by Sir Philip Nicholls, the British Ambassador, and M. Vladimir Clementis, Czechoslovakian Under-Secretary for Foreign Affairs, runs indefinitely, but may be denounced at 12 months' notice by either party.

ENGINEER CRITICIZES DC-6

CRITICISMS of the Douglas DC-6 transport aircraft have been made in a paper by Mr. Marvin Whitlock, director of service engineering for American Airlines. Prepared for the Society of Automotive Engineers, this paper was withdrawn and never read, but its contents were reported in the *American Aviation Daily*. It was a DC-6 aircraft that crashed in Utah on October 24th, with the loss of 55 lives.

Mr. Whitlock is reported to have alleged that excessive wear on the elevator, rudder and trim tab mountings had been noticeable after 500-700 hours, compared with 5,000-8,000 hours on the DC-4; that wiring was deficient and workmanship inferior; accessibility for servicing was poor; prop. de-icers short-lived; and that engine cowlings could be dented with the thumb.

The Utah crash was caused by a fire in flight. To comply with new regulations brought out after it had reached the production stage, the DC-6 had built-in fire-extinguishing systems in the two compartments not accessible to the crew during flights, as well as smoke and heat indicators. Official investigators at the scene of the accident reported on the possibilities of inflammable materials in the passengers' luggage, and wiring defects or trouble in the combustion heater in the rear of the fuselage.

BREVITIES

Mr. W. N. Cumming has been re-elected chairman of the British Air Charter Association; Mr. D. F. McIntyre is to be vice-chairman and Capt. G. P. Olley, treasurer.

* * *

The Martin 202 has been approved by the American C.A.A. for taking off from runways of 1,210 yards.

* * *

Que Que, a Rhodesian steelworks town, is to have a landing ground for heavy aircraft. The present landing field is only suitable for light aircraft.

* * *

By ratifying the Convention on International Civil Aviation Colombia has become the 44th member state of I.C.A.O. There are now thirteen Latin-American members.

* * *

Control of the Newark (New Jersey) airport and seaport has been taken over by the Port of New York Authority, which plans to spend over £56,000,000 to modernize the La Guardia and Newark airports.

In answer to a question in the House the Minister of Supply stated that including workshops, hangars and runways the Saunders-Roe flying boat S.R.45 had cost to date approximately £650,000. The de Havilland 106 £800,000 and the Brabazon I £5,750,000. The cost of completion could not, he said, be estimated since it depended on the number of production aircraft ordered.

* * *

After a nine-day flight from London in a Miles Gemini, Lt.-Col. Musprat-Williams, Northern Rhodesia's Secretary for Civil Aviation, has arrived in Lusaka. The route passed over the Rukwa swamps between Wadi Halfa and Kisumu: the

MORE POWERFUL GEMINI: Two 125 h.p. Continental C-125 engines have been installed experimentally in a Miles Gemini, here shown during trials, which are reported to be satisfactory.

Civil Aviation News . . . . .

swamps are crocodile-infested, and the authorities insist on aircraft flying in pairs, as a navigation check and to pin-point forced landings.

* * *

The French authorities have granted D.N.L. the right to carry passengers between Marseilles and Rome.

* * *

A service between Tahiti and New Caledonia, using a Catalina flying boat, was scheduled to commence on October 28th. The operators are TRAPAS (Transports Aeriens du Pacifique Sud).

* * *

When the B.O.A.C. Solent flying boats start landings near Livingstone, they will be refuelled by a 50ft, 16-ton launch which has now arrived at its Zambesi base.

* * *

The B.S.A.A. aircraft *Star Tiger*, the second Tudor IV to be introduced on the Caribbean service, landed at Heath Row at 0641 hrs on November 11th, having taken off from Bermuda at 1852 hrs the previous day. Capt. A. G. Store, the operations manager of B.S.A.A., was in command.

* * *

It is understood that 216 passengers and aircrew have been killed in airline accidents in the United States this year. The fatalities occurred in five accidents. The rate for the first ten months of 1947 works out at approximately 3.78 per 100,000,000 passenger miles flown.

* * *

Air India services were curtailed at the end of last month owing to the demand for eleven of the company's Dakotas to be used on government flights between Delhi and Srinagar. As the landing field at Srinagar is unsuitable for Vikings, Air India maintained a skeleton service on normal routes with that type only.

* * *

All operators have been requested by the manufacturers to ground their DC-6 aircraft. A Douglas DC-6 landed in flames at Gallup, New Mexico, recently but all the passengers escaped unhurt. Some American users are continuing to fly the DC-6 but without using the heating system.

* * *

Pan American Airways flew 502,902,000 passenger miles in the third quarter of 1947, compared with 320,078,234 miles in the corresponding quarter of 1946, and 446,252,000 in the second quarter of 1947. This is an increase of over 36 per cent above the same quarter for 1946.

* * *

Despite the announcement at the recent I.A.T.A. Conference (*Flight*, October 30th) that international air rates generally would be kept at their present level during the coming winter, Australian airlines have been forced by rises in operational and maintenance costs to seek a 20 per cent increase in passenger fares. It is stated that the Minister for Air will agree to this increase.

* * *

Under new regulations issued by the Civil Aviation Department in Australia, non-scheduled flights will be subject to a more rigid control. Aircraft not provided with blind-flying instruments and radio aids will not be permitted to proceed under certain adverse weather conditions; routes must be specified and pilots directed to adhere to them; and arrival reports will be compulsory. This action has been taken in an effort to reduce the high costs involved in searching for missing aircraft on non-scheduled flights.

FROM THE CLUBS

Pupils under the Cowes Aero Club's scheme for providing flying instruction for holiday-makers this season included visitors from Holland, France, the U.S.A., Malaya and West Africa; over 200 people received instruction during the year and some 50 new "A" licences and several renewals were granted. Between 5 and 9 Austers were operated by the Club, and Proctors were used for advanced training. A number of visiting aircraft took advantage of the facilities offered by the Club.

* * *

A non-stop flight from Basle to Copenhagen in about six hours was recently made by Mr. Niels Skov, of Sportsflyveklubben, Copenhagen, with an Auster Autocrat.

* * *

Instead of reducing the number of staff and fleet of aircraft during the winter months, the Wiltshire School of Flying, Ltd., is to maintain its full establishment—seven Austers, two Magisters and three full-time instructors—and to offer flying at reduced rates. Members are being invited to make a contract for 10, 20 or 30 hours flying at £2 15s, £2 10s and £2 5s per hour respectively. In September, members flew 281 hours and in October 201 hours. The club's airfield is at Thruxton, Andover, Hants.

* * *

Reading Sky Observers' Club paid a visit to the de Havilland works at Hatfield on November 1st and inspected the D.H. 108 Swallow research aircraft, the Lancastrian with the Ghost engines, and production types.

* * *

Aircraft of the Cambridge and University Flying Clubs flew 136 hours in October. Thirteen new members joined, nine of them as pupils and the remainder ex-Service pilots.

* * *

The Danish Aeronautic Club is to hold a civil aviation exhibition in Copenhagen in the autumn of 1948. A Committee is now planning the exhibition, which is to be open for two weeks.

* * *

Seven of the 50 Piper Cubs purchased in Germany for the Norwegian flying clubs at Bardufoss, Grenland, Vaernes, Ringerike, Bergen and Oslo have now been delivered. There are 45 flying clubs in Norway.

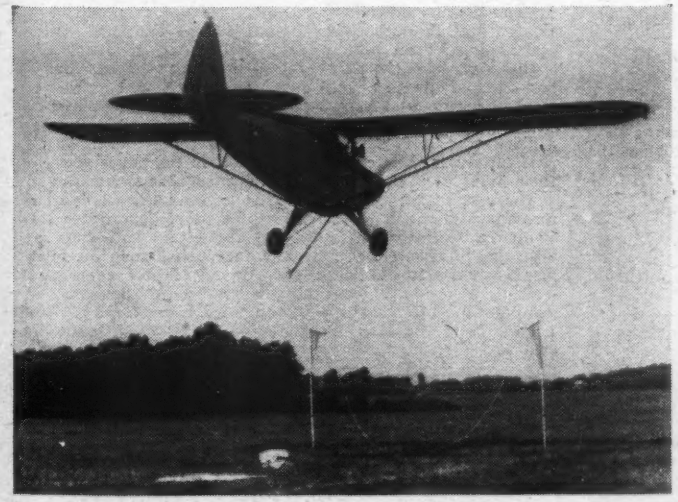
* * *

There is no entry fee to the newly formed Hereford Aero Club referred to in *Flight* on October 23rd. Temporary members pay a one guinea subscription for two months, and Service members two guineas yearly.

* * *

India has seven active flying clubs, with headquarters at Bombay, Calcutta, Patna, Madras, Lahore, Delhi and Karachi, which receive Government subsidies. They flew 10,700 hours during the first six months of 1947, more than the total for the whole of 1946. Of the 84 Tiger Moths on loan to A.H.Q., India, 30 have been returned to clubs and one of the Link trainers has returned to Juhu, Bombay; the second is still held.

The Orissa Flying Club has staff and aircraft and may be subsidized, while new clubs have been formed at Lucknow, Orissa and Cawnpore, where the United Provinces Club has its headquarters. This club has a Provincial Government subsidy.



SNATCH AND GRAB: Practising supply pick-ups with the Piper Super Cruiser which is to attempt a non-stop round-the-world flight *(see page 572).*

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

SUBSIDIZED FLYING

Age Limit Suggested

IN regard to the proposal of subsidies to flying clubs, put forward by Mr. Whitney Straight, may I, through the courtesy of your columns, suggest an age-limit be included in such a proposal to ensure the taxpayers' money is not wasted on teaching people to fly whose age, in the event of a war, would debar them from flying?

While it is essential for the safety of the country that there should be a floating reserve of pilots, it seems a little wasteful to train pilots who would never be allowed to fly in a war on account of their age. By no means refuse them opportunity to learn, but insist on them paying a normal rate.

I suggest an age-limit of 30 because, in the event of a war in two years' time, a man of 32 would only just be allowed to take on full flying duties; any age beyond that *must* be a waste of taxpayers' money. When all is said and done, subsidies come out of the pockets of the whole taxpaying population who cannot *all* be wanting to learn to fly, so that the many would be paying for the few.

F. S. SYMONDSON.

FLYING BOATS

Capt. Brice Still Demanding Answers

IT would appear that Mr. Kemp and certain other gentlemen, in their anxiety to produce the evidence of the *Sky Queen*, entirely missed most of the points in my argument, and thus, unfortunately, did not answer them.

I know as well as anyone that, with good luck and certain sea conditions, one can land a flying-boat in the open sea. You will recall that my last paragraph dealt with this at some length, and also the disadvantages of doing same.

My article dealt with regular airline operation, not freaks of flying, or such gross mismanagements as caused the *Sky Queen* episode.

Rivers are useless for the big boat. The Shetland was not tested at Rochester in all respects. Not even a Lankester Parker would relish a full-load landing on the Medway, and even if he had done it, he would, I am sure, be the last to recommend it for airline work. One would gather that aircraft were for ever needing to force-land somewhere. They seldom do in airline operation.

I wish that the boat zealots, now that the *Sky Queen* has given them such a morale boost, would answer my *practical* objections to the boat. The problem of blind approaches, the limited number of bases around the world, which no amount of concrete can remedy, the financial problems caused by the few boat facilities still existing, the water-ice problems of the North Atlantic route.

If someone could give me a reasonable answer to these problems, I might believe in the future of the boat.

I am not an enthusiast of any particular sort of aircraft, but if I were an airline operator I would plumb for landplanes. And when one states that airports for the 200-ton landplane will be too costly and too few, one must always remember that the mightiest and wealthiest country in the world is building such aircraft, and my guess is that the U.S.A. will see that the necessary bases are built, even if no one else does.

DAVID BRICE.

WOMEN PILOTS

Every Bit as Good as the Men

YOUR correspondent, L. Heather, who holds forth on Women Pilots (*Flight*, November 6th), presumes upon the intelligence of your readers, and I would advise him—presuming that he is a mere male like myself—to acquaint himself with a few facts before rushing into print.

He complains that women have contributed little towards the development of aircraft. We can, therefore, fairly assume that his knowledge of aeronautical matters is such that he has never heard of such names as Mrs. F. G. Miles and Amy Johnson—to mention only two out of scores.

His remark that women's work in A.T.A. could have been more efficiently done by men unfit for operational duties is sheer drivel, and no comparison can be fairly drawn. However, if L. Heather does want comparisons, then on the strength of eight years' instructional experience in the R.A.F. and A.T.A. I will do battle with him.

During the recent war it fell to my lot to convert dozens of A.T.A. women, and R.A.F. seconded personnel, on to the heavier type of Service aircraft. The women were invariably ready to go solo long before the men, and I found that they assimilated technical information far more easily than their male counterparts. Furthermore, my records show that for every woman pilot who failed to make the grade seven men were turned down.

The reason for this is obvious. Many of the men who were unfit for operational R.A.F. duty had—through no fault of their own—some snag in their background, whereas the women represented the cream of the country. With regard to R.A.F. pilots seconded to A.T.A., it must be remembered that their previous experience was usually limited, and few had flown more than half-a-dozen different types before reaching the twin and multi-engined categories. The A.T.A. woman pilot at the same stage usually had forty or fifty types already logged, and, in consequence, was considerably more versatile.

On this basis it might be argued that, given the same experience, the operationally unfit male would have reached the same high standard. This contingency never arose, which is precisely my reason for saying that it is not possible to draw a fair comparison.

I would remind your correspondent that during the first bleak winter of the war a mere handful of women A.T.A. pilots—there were less than a dozen to start with—ferried over 2,000 aircraft without so much as scratching one of them. As their number increased, so did their reputation, and the final analysis when A.T.A. disbanded showed the women to be every bit as good as the men.

Although the accident rate was infinitesimally small, the A.T.A. women paid a high price to achieve this end. At no time did their strength exceed 110, and yet no fewer than 17 sacrificed their lives.

With the exception of such periodicals as yours, which have always championed the cause, little has been done to make the general public aware of the great contribution made by the women pilots of A.T.A. to the defeat of our enemies.

"AETHERIS AUIDI."

HANGING FIRE

Club Funds Beginning to Run Out

FOR months the private flying world has been anxiously awaiting the publication of the recommendations of the Whitney Straight Committee and Mr. Peter Masefield's I.L.A.C., and as far as private owners and club pilots are concerned the general opinion is that the committees have done a jolly good job. No worse time could have been found for making the recommendations, but that is no one's fault in particular, and, like other pilots, I am keeping my fingers crossed and hoping for the best.

Unfortunately, the publishing of these recommendations has had one bad effect from the clubs' point of view, because quite a lot of people who have carefully boarded their shillings and pence in order to be able to afford a few hours' flying have decided that it is worth while waiting for a month or two, particularly as the weather is now bad, in the hopes of getting their flying at about a third of the price next summer.

The cost of implementing a part or even the whole of the recommendations in the reports would be comparatively small compared with that of other Government undertakings, and although pilots are perfectly convinced that such an investment would pay dividends they do not expect everyone to agree with them. One thing that is needed, however, is a decision of some sort as quickly as possible, for there is a limit to how long the clubs can hold on under the present conditions.

HAROLD BURGOMASTER.

FORTHCOMING EVENTS

Nov. 29th.—Pathfinder Ball, Dorchester Hotel, Park Lane, London.
Dec. 4th.—Royal Aeronautical Society: "Problems Facing Civil Airline Operators." N. E. Rowe, C.B.E., B.Sc., D.I.C., F.R.Ae.S.
Dec. 6th.—Helicopter Association of Great Britain: "Some Aerodynamic Problems of the Helicopter." H. B. Squire.
Dec. 7th.—Royal Institution of Gt. Britain: "The Advent of the Aircraft Gas Turbine." A. Cdre. F. Whittle, C.B.E., M.A., F.R.Ae.S., Hon. M.I.Mech.E.
Dec. 12th.—R.Ae.S. (Graduate and Student). "Aircraft Design from the Airline Point of View." Christopher Dykes, A.F.R.Ae.S.

SERVICE AVIATION

"Flight" photograph.

FIGHTER NAVIGATOR: Proposed duties of the de Havilland Sea Hornet 21, the prototype of which is seen, are bad-weather fighting and the navigation of single-seat strike aircraft. This variant is a two-seater.

C.A.S. Returns

MARSHAL of the R.A.F. Lord Tedder, Chief of the Air Staff, landed at Northolt from Istres, France, on November 9th after his tour of the Middle East. Lady Tedder had accompanied the C.A.S. and had examined welfare facilities provided by Malcolm Clubs.

FOREIGN LIAISON: Vice-Admiral N. Ozdeniz, a member of the Turkish Military Mission which has been visiting this country, in conversation with F/L. G. H. Pearce on his arrival at London Airport.

Naval Representative at M.o.S.

REAR-ADMIRAL L. D. The Mackintosh of Mackintosh, D.S.O., has been appointed Vice Controller (Air) Chief of Naval Air Equipment and chief Naval representative at the Ministry of Supply.

In Defence of the "Mossie"

COMMENTING on evidence before the Washington Senate Investigation Committee, a Canadian pilot, who flew Mosquito bombers over Germany, said that this type was "one of the finest of the war and certainly the most versatile—an aircraft that could take a lot of punishment and still come home." Evidence had been presented that the Mosquito had been found unsatisfactory by the U.S. Army Air Force.

Royal Air Force and Naval Aviation News and Announcements

Prentice Power

IT was mentioned last week that Percival Prentice elementary trainers are now being delivered to the R.A.F. with Gipsy Queen 32 engines, and that later more powerful engines may be fitted. It is probable that the Air Force will not wish to fit supercharged Gipsies to an elementary trainer, although it is felt that a little more power would be desirable. No geared version of the unsupercharged 32 exists at present, so home units may start to operate with standard 32s fitted, while high-altitude overseas stations may have special Prentices with either supercharged 50 series or geared and supercharged 70 series Gipsy Queens installed.

A.V-M. Sir Basil Embry, K.B.E., C.B., D.S.O., D.F.C., A.F.C. (Assistant C.A.S., Training), inspecting the Percival Prentice during a visit to Luton last week. He flew the machine himself. On the right is Mr. Carruthers, Percival's chief test pilot.

Training Halts in Germany

THREE squadrons of Meteors lately returned to the U.K. after a two months stay in Germany, marking a halt until next spring in a long-term R.A.F. training operation which has continued, with a break during the winter months, since May, 1946. As described in *Flight* of June 5th this year, squadrons have been based at Lübeck for training in the use of armament and in liaison with ground forces. One of the squadrons lately returned is No. 92.

R.A.F. Personnel Reductions

IN reply to a Parliamentary question by Mr. J. Morrison, Mr. Arthur Henderson has stated that the number of officers, airmen and airwomen released from the R.A.F. between July 1st, 1945 and June 30th, 1946 was 738,276. Between July 1st, 1946 and June 30th, 1947, 282,513 were released, and a

Service Aviation . . . . .

further 50,000 are expected to have been released by December 31st this year. The total strength of the R.A.F. on July 1st, 1945 was 1,115,600 and it is estimated that on January 28th, 1948, the figure will be 306,000. Thus the R.A.F. will have been reduced by 72.5 per cent.

National Service Pilots

STARTING with December's registration, a limited number of men called up for national service in the R.A.F. will be accepted for training as pilots. The entry will be restricted to cadets holding the A.T.C. Proficiency Certificate who have obtained the School Certificate or reached an equivalent educational standard. After training, and on completing their period of whole-time national service, national service pilots will be required to enlist in one of the Air Force non-regular forces for a period of reserve service. They will be eligible for retaining fees and other allowances at the usual rates.

Proficient cadets not selected for training as pilots will be employed in a ground trade during their national service with the R.A.F. They can choose their own trade from those open to national servicemen and will receive over-riding priority for entry into trade training courses.

Boxing in Paris

IN an amateur boxing tournament in Paris, a team representing the R.A.F. drew with the French Air Force, each side winning four bouts. The results were as follows:

Flyweight: Leslie Howell (R.A.F.) beat Private Dorgigne by a knock-out in the first round; *Bantam weight:* James Duncan (R.A.F.) beat Andre Tidois on points; *Featherweight:* Charlie Tucker (R.A.F.) beat Morlay Camara on points; *Lightweight:* Private Laurent (France) beat Ronald Bruzas on a technical knock-out in the first round; *Welterweight:* Jimmy Core (R.A.F.) beat Yves Tervelet by a knock-out in the second round; *Middle weight:* Michel Lapourielle (France) beat Peter Cox on points; *Light/Heavyweight:* Joseph Rude (France) beat Ray Edwards by a knock-out in the second round; *Heavyweight:* Henri Caltot (France) beat P. Colgan on points.

INVESTITURE: Wing Commander Archer leaves the Palace with his wife on November 4th after receiving his D.S.O.

SKIRL O' THE PIPES: Headed by their mascot (who won many hearts among the spectators) the Central Band of the A.T.C. put up a splendid performance in the Lord Mayor's Show. The R.A.F. was represented by their own Central Band and by agricultural demonstrations in keeping with the theme "The Country Comes to the City."

R.A.F. Transport Flying

PASSENGER and troop-carrying aircraft of the R.A.F. flew about 7,800,000 miles during September without accident.

Ship Target Trials

AS part of the Admiralty's comprehensive series of ship target trials a programme of research is now in progress in Loch Striven with the object of discovering the effects on ship structures of explosive charges detonated at various distances from the hull, conditions simulating "near misses." One cruiser, three British destroyers and an ex-German destroyer are being used for the trials in addition to certain smaller ships.

The entire series, which was planned in 1945, is aimed at the study of the effects of various weapons including bombs, torpedoes and mines upon ship structures. In certain of the trials which have already taken place in the Portsmouth area, ships were subjected to direct hits.

Denmark Remembers

THE inscription on a memorial erected by the inhabitants of Aabenraa, South Jutland, to the 138 Allied airmen who are buried there, reads "They also died for Denmark." In the form of a carved stone plinth, the memorial overlooks the graves and was paid for entirely by the people of this small Danish town.

The most careful attention is given to the graves of airmen buried throughout Denmark, notably at Ranabol, where a large memorial has been erected to five of the crew of an R.A.F. bomber. According to Miss Joan Leitch, who has been visiting Denmark, the appreciation of the Danish people of the part played by the Allied Air Forces has also found expression in a book entitled *They Died For Us*, written by a Dane and giving an account of all Allied airmen shot down over Denmark, with photographs of the cemeteries in which they are buried.

Sharing the Load

THE Air Ministry, at the request of the Electricity Commissioners, is to help relieve the load on the public grid during electricity peak demand periods. Emergency generating plants were installed during the war at R.A.F. operational stations and at many maintenance and equipment units. The plant was not intended to be run continuously but when the Air Ministry was asked what assistance could now be given, the Works Directorate decided that the plant could be kept running between 7.30 a.m. and 5.30 p.m. daily for five days a week from now until the end of March.

Reunions

A 298 SQUADRON reunion will be held in London on December 6th. Details from D. R. Wells, 52, Green Hill, London, N.W.3.

* * *

It is proposed to hold a reunion in London of ex-R.A.F. personnel who served in West Africa. Any "Old Coasters" wishing to attend the reunion, which will probably be on January 17th, should write to J. V. Heriz-Smith, "The Nook," Uxbridge Rd., Harrow Weald, Middlesex. Tickets will be about 25s.

* * *

At a reunion dinner, attended by some fifty ex-officers, N.C.O.s and airmen of No. 669 Squadron and Nos. 23, 24 and 27 G.S.E.s on October 24th, an association, with S/L. James Rush, A.F.C., as President, was formed and a reunion in 1948 decided upon. Ex-members of the units concerned can obtain full details from Mr. P. O'Brien, 4, Walton House, Longford Street, London, N.W.1.

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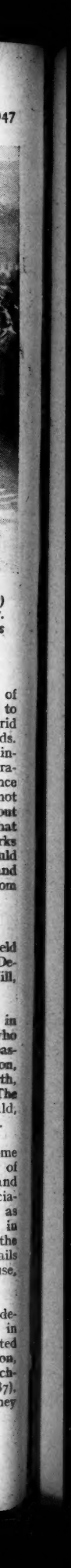
There will be a reunion of ex-Rhodesian Air Training Group personnel in London next January. Those interested should contact S/L. Alfred Cuddington, Hermitage Lodge, The Hermitage, Richmond, Surrey ('phone: Richmond 3287), giving the R.A.T.G. units in which they served and dates.